

RESEARCH

Open Access



# Neighbourhood and family correlates of immigrant children's mental health: a population-based cross-sectional study in Canada

Amanda Sim\* and Katholiki Georgiades

## Abstract

**Background:** Immigrant children exhibit significant variation in their mental health outcomes despite disproportionate exposure to socio-economic adversity compared to their non-immigrant peers. Identifying aspects of neighbourhood and family contexts that are most salient for immigrant children's mental health can help to inform and target interventions to prevent mental disorder and promote mental well-being among this population.

**Methods:** The study analyzed multi-informant data from 943 first- and second-generation immigrant caregiver and child dyads from the Hamilton Youth Study, a representative sample of immigrant and non-immigrant families in Hamilton, Ontario. Multivariate multilevel regression models examined associations between neighbourhood and family characteristics and processes, and parent and child self reports of internalizing and externalizing problems.

**Results:** Positive and negative parenting behaviours were significantly associated with internalizing and externalizing problems, with negative parenting demonstrating associations with externalizing problems across both parent and child reports ( $b = 0.26\text{--}1.27$ ). Neighbourhood social disorder and parental trauma exposure were associated with greater internalizing and externalizing problems, and neighbourhood immigrant concentration was associated with fewer externalizing problems for parent reports only. Adding parental distress and parenting behaviour to the models reduced the coefficients for parental trauma exposure by 37.2% for internalizing problems and 32.5% for externalizing problems and rendered the association with neighbourhood social disorder non-significant. Besides the parenting variables, there were no other significant correlates of child-reported internalizing and externalizing problems.

**Conclusions:** Results highlight the importance of parenting behaviour and parental experiences of trauma and distress for immigrant children's mental health. While not unique to immigrants, the primacy of these processes for immigrant children and families warrants particular attention given the heightened risk of exposure to migration-related adverse experiences that threaten parental and family well-being. To prevent or mitigate downstream effects on child mental health, it is imperative to invest in developing and testing trauma-informed and culturally responsive mental health and parenting interventions for immigrant families.

**Keywords:** Immigrant, Children, Mental health, Parenting, Family, Neighbourhood

## Background

Immigrant children exhibit significant variation in their mental health outcomes despite disproportionate exposure to socio-economic adversity compared to their

\*Correspondence: siml3@mcmaster.ca

Department of Psychiatry and Behavioural Neurosciences, McMaster University, The Offord Centre for Child Studies, Hamilton, ON, Canada



© The Author(s) 2022. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

non-immigrant peers [1]. Identifying the factors that matter most for immigrant children's mental health, particularly in their most proximal environments of the family and neighbourhood, can help to elucidate why some immigrant children thrive while others falter, which in turn can inform targets for interventions [2]. Such evidence has significant implications for immigrant-receiving societies such as Canada, where over a third of all children under 15 has at least one foreign-born parent and population projections estimate that half will be of immigrant background by 2035 [3]. Compared to non-immigrants, recent immigrant families in Canada are more likely to live below the poverty line, have lower mean levels of household income, and live in neighbourhoods characterized by greater socio-economic disadvantage – all established risk factors for poor child mental health outcomes [4–6]. Immigrant families, including those who resettled as refugees fleeing persecution or armed conflict in their home countries, are also likely to experience adverse life events (e.g., trauma, discrimination) and acculturative stressors (e.g., language barriers) that can have direct and indirect effects on children's mental health via impaired family processes [7].

This study uses data from a diverse population-based sample of first- (foreign-born) and second-generation (born in Canada to at least one foreign-born parent) immigrant children in Canada to examine associations between immigrant children's mental health and characteristics of their neighbourhoods and families. Identifying aspects of neighbourhood and family contexts that are most salient for immigrant children's mental health is crucial for informing and targeting interventions to prevent mental disorder and promote mental well-being among this population.

### **Neighbourhood and family influences on immigrant children's mental health**

Recent conceptualizations of immigrant children's adaptation and psychological adjustment adopt a multilevel approach integrating risks and resources at the global, political-social, microsystem, and individual-level contexts [8]. Of these, Microsystems such as neighbourhoods and families are understood to be proximal contexts for all children, including immigrant children, constituting profound and enduring influences on their mental health [9].

Neighbourhood disadvantage, as assessed by socio-economic indicators (e.g., poverty, unemployment rates) and social processes (e.g., neighbourhood social disorder), has been linked to adverse child mental health outcomes [5]. These effects may occur through several pathways, including poorer availability or quality of health and social services in the community, as well as

lack of collective efficacy around children's safety and well-being [10]. In addition, studies have shown that living in neighbourhoods characterized by high levels of disorder (e.g., drug and alcohol use, crime) may increase risk of adverse childhood experiences such as maltreatment and family dysfunction, which in turn may be associated with higher levels of child mental health problems [11]. While immigrant families tend to reside in less affluent and more unstable neighbourhoods [4], evidence on the extent to which associations between neighbourhood disadvantage and poor mental health outcomes hold for immigrant children is mixed. Research with Latino immigrant youth in the United States has found both positive and null associations between neighbourhood poverty and internalizing problems [12, 13], and there appears to be little evidence of direct or indirect effects of individual perceptions of neighbourhood safety and cohesiveness on immigrant and refugee children's mental health [14, 15].

There is more consistent support in the literature for neighbourhood immigrant concentration as a potential protective resource, with several studies demonstrating associations between higher immigrant concentration and more positive mental health outcomes for immigrant children and youth [4, 12]. The protective effect of immigrant concentration may be explained by the concept of person-environment fit [16], which posits that similarities in socio-economic, cultural, and ethnic characteristics may enhance opportunities for social cohesion, collective efficacy, and shared norms and values that buffer immigrant children from poor mental health outcomes [17].

Neighbourhood influences on immigrant children's mental health may also operate indirectly through family processes, for example, by reducing families' access to financial, social, and institutional resources and increasing family stress and dysfunction [10, 18]. The Family Stress Model posits that economic stressors increase the risk of child mental health problems through parental distress and impaired parenting [19, 20]. This model could be extended to include other types of stressors such as parental exposure to traumatic or adverse life experiences such as discrimination [21], particularly in view of growing evidence showing intergenerational links between parental trauma and distress, impaired parenting, and child psychopathology in the general population and in refugee and immigrant populations [22, 23].

Many immigrant families also occupy intersecting social positions (e.g., low-income, refugee status, low educational attainment) that may increase risk of poor mental health among their children [24]. There is a large body of evidence linking family poverty and its correlates to a range of negative outcomes for children. Studies have

demonstrated both direct and mediated effects of family poverty via parental and child stress, family conflict, and access to resources [25]. These patterns, however, appear to be more nuanced among immigrant groups. Analysis of the Canadian National Longitudinal Survey of Children and Youth (NLSCY) found that the association between family poverty and externalizing problems was attenuated among children living in recent immigrant families compared to non-immigrant children [4, 26]. Other universal and migration-specific socio-demographic factors such as parental educational attainment, refugee status, and proficiency in the host country language, have demonstrated null or inconsistent associations with child mental health in a non-probability-based sample of Canadian immigrant and refugee youth across six major urban areas [27].

#### Inter-informant variation in mental health correlates

The ability to draw conclusions from existing research on children's mental health is further challenged by discrepancies in parent's and children's ratings of mental health and mental health correlates. Inter-informant discrepancy in child mental health ratings is a well-established phenomenon that may be more pronounced among immigrant and ethnic minority groups due to cultural and intergenerational differences in appraisals and expectations of child behaviour [28, 29]. Yet few studies have systematically examined inter-informant variation in correlates of immigrant children's mental health, despite evidence of predominantly informant-specific associations in the general population [28]. Reliance on single informant reports in studies on immigrant children's mental health poses the risk of important correlates being unrecognized or misidentified, which in turn has implications for the development and targeting of interventions [30].

#### The current study

The current study aims to address gaps in the extant literature by examining associations between immigrant children's mental health and universal and migration-specific risk and protective factors in the neighbourhood and family contexts. These risk and protective factors are clustered around five interrelated domains from the most distal to the most proximal: neighbourhood structural characteristics (i.e., immigrant concentration, median household income, unemployment rate, neighbourhood social disorder); family socio-demographic characteristics (i.e., parental refugee status, recency of arrival in Canada, English language proficiency, educational attainment, low-income); parental exposure to trauma and discrimination; parental distress; and positive and negative parenting behaviour. Specific study objectives were to: (1) examine associations between characteristics of

neighbourhood and family contexts and immigrant children's internalizing and externalizing problems; 2) assess the extent to which the magnitude of associations with more distal neighbourhood and family correlates are reduced by taking into account more proximal parental distress and parenting variables; and 3) examine differences in correlates of immigrant children's mental health across parent versus child self reports of internalizing and externalizing problems.

## Methods

### Participants and procedure

We analyzed data from the Hamilton Youth Study (HYS), a probability-based cross-sectional survey of 1,449 first-generation immigrant (born outside Canada), second-generation immigrant (born in Canada to at least one parent born outside of Canada), and non-immigrant (born in Canada to Canadian-born parents) children in grades 5–8 attending 36 elementary schools in Hamilton, Ontario. Hamilton has a large and diverse immigrant population, ranking fifth nationally and second in Ontario for its proportion of foreign-born population at 24.1% [31]. For the purposes of this study, only first and second-generation immigrant children were included in the sample ( $n=943$ ).

Given the comparative nature of the HYS, cost-effective sampling methods were developed to enlist a representative sample of immigrant students and a comparison of non-immigrant students living in similar neighbourhoods and attending the same schools. Assuming a response rate of 75% at the student level and a sampling strategy designed to enlist equal numbers of immigrant (first and second generation) and non-immigrant students per school (12/group), schools with a minimum of 16 first-generation immigrant students were eligible to participate ( $n=54$  schools). A two-stage (school, student), stratified random sampling method was used to select schools and students. At stage 1, schools were stratified by percentage of first-generation immigrant students (low, medium, high) and a simple, random sample of 12 schools was selected from each stratum. School sampling weights were generated on the basis of the probability of selection (1/probability of selection). At stage 2, students within schools were stratified on the basis of country of birth (i.e., in or outside Canada) and first language (i.e., English/not English), and simple random samples from each stratum were selected for a total of 36 students per school (i.e., 12 students born outside of Canada, 12 students born in Canada but whose first language was not English and 12 students born in Canada whose first language was English). Student level sampling weights were generated on the basis of the probability of selection (1/probability of selection).

A letter was sent home to selected families introducing the study and inviting their participation. Families who did not wish to be contacted further about the study were asked to indicate this on the letter and return it to the school. All other families were contacted by telephone by research staff to introduce the study, obtain informed consent and schedule an interview. Written parental consent and child assent were obtained prior to conducting separate interviews with the child and the person most knowledgeable about the child, usually the parent. In order to address language-related barriers to participation, interviews were conducted in the respondent's home or at the child's school by a trained multilingual team of interviewers using study materials translated into 8 languages (Arabic, Urdu, Spanish, Vietnamese, Serbian, Chinese, Tagalog and Somali) in addition to English. Response rates were 92% at the school level and 70% at the student level. The study was approved by the Hamilton Integrated Research Ethics Board.

## Measures

### **Neighbourhood characteristics**

Neighbourhood was defined as the dissemination area (DA) used in the 2011 National Household Survey (NHS), comprising a population of 400 to 700 persons [32]. Data for neighbourhood variables were derived from the 2011 NHS using participants' postal code to link to the DA. Neighborhood-level variables derived from the 2011 NHS at the DA level included: percentage of first-generation immigrants, median family income, and unemployment rate. To obtain a measure of neighbourhood social disorder, parents' responses to 7 items (e.g. *How much of a problem are litter, broken glass or garbage in your neighbourhood?*) adapted from the Project on Human Development in Chicago Neighborhoods Community Survey [33] were summed and scores were aggregated up to the DA level by estimating a mean score across all parent responses within a given DA.

### **Family demographic characteristics**

These variables included: (1) refugee status, assessed by the parent's response to the item "Did you come to Canada as a refugee?" (0 = no, 1 = yes); (2) number of years since arrival in Canada; (3) parental educational attainment (0 = Bachelor's or above, 1 = below Bachelor's, 2 = high school or less); (4) parents' self-rated English proficiency (1 = poor, 2 = proficient, 3 = fluent/native); and (5) household poverty derived from parental self-reports of total household income and using the 2010 Statistics Canada low-income measure (LIM) (0 = not low income, 1 = low income) [34].

### **Parental exposure to trauma and discrimination**

Lifetime trauma exposure was assessed by 12 items (e.g. *"Have you ever been hit, punched or kicked very hard?"*) adapted from Part 1 of the Harvard Trauma Questionnaire (HTQ), a self-report measure developed by expert consensus methods to measure experience of trauma [35]. The HTQ has been widely translated and used with refugee and other trauma-exposed clinical and community samples around the world and has shown excellent temporal stability and internal consistency [36]. Responses to the 12 items used in our study were summed to reflect the number of different traumatic events experienced by participants, given evidence of a dose-response effect of trauma exposure on depression and post-traumatic stress symptoms [37].

Perceived discrimination was assessed by the Experiences of Discrimination (EOD) Scale, which is composed of 9 items assessing frequency of perceived discrimination due to the participant's race or ethnicity in a variety of situations in the past 12 months (e.g. *Getting hired or getting a job*) [38]. The EOD scale was found to be a valid and reliable self-report measure of discrimination in an ethnically diverse community sample, demonstrating adequate internal consistency and test-retest reliability and good construct validity [38]. Internal consistency reliability in this sample was 0.73. Responses (0 = never, 1 = once, 2 = 2–3 times, and 3 = 4 or more times) were summed to obtain an overall score of perceived discrimination (min = 0, max = 27), which was used in the analysis as a categorical variable consisting of high (4–27), moderate/low (1–3), and no discrimination (0).

*Parental distress* was assessed by the 10-item Kessler Psychological Distress scale (K-10) [39]. The K-10 is widely used to screen for anxiety and depression and previous studies with culturally and ethnically diverse samples have shown evidence of a single factor structure and good internal consistency reliability and criterion validity [40]. Parents were asked how frequently they experienced symptoms of nonspecific psychological distress during the past 30 days (e.g., *Feeling so depressed that nothing could cheer you up*). Responses (1 = none of the time, 2 = a little of the time, 3 = some of the time, 4 = most of the time, 5 = all of the time) were summed to obtain an overall score of parental distress (min = 10, max = 50). Internal consistency reliability in this sample was 0.89.

### **Parenting behaviour**

Parents and children responded to 18 items on parenting behaviours drawn from the Parent Behavior Inventory [41] and Cycle 3 of the NLSCY [42] (e.g., *I smile at <child name> very often, I threaten to hurt <child name>*). Exploratory factor analysis with Promax rotation showed

that 10 items describing positive parenting behaviours loaded onto one factor, while 5 items describing negative parenting behaviours loaded onto a second factor. The remaining 3 items did not load onto either factor and were dropped from the analysis. Responses (1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, and 5 = *always*) were summed to obtain parent and child scores of positive (min = 10, max = 50) and negative (min = 5, max = 25) parenting. Internal consistency reliability was 0.89 and 0.64 for parent-reported positive and negative parenting respectively, and 0.92 and 0.69 for child-reported positive and negative parenting respectively. Correlations between parent- and child-reported positive ( $r=0.22$ ,  $p<0.001$ ) and negative parenting behaviours ( $r=0.12$ ,  $p<0.001$ ) were small in magnitude.

#### **Child internalizing and externalizing problems**

We used 104 items from the Child Behavior Checklist for Ages 6–18 (CBCL/6–18) and Youth Self-Report (YSR) to assess internalizing and externalizing problems in the past 6 months [43]. The CBCL and YSR have been translated into over 100 languages and validated with diverse cultural groups, with findings from 44 societies in Asia, Africa, Europe, South America, and North America showing international consistency in model fit and age and gender patterns [44]. Raw scores were converted into standardized *t*-scores for the broadband scales of internalizing (withdrawn, somatic complaints, and anxious/depressed subscales) and externalizing (delinquency and aggression sub-scales) behaviours. Correlations between parent- and child-reported internalizing ( $r=0.16$ ,  $p<0.001$ ) and externalizing problems ( $r=0.20$ ,  $p<0.001$ ) were small in magnitude, consistent with meta-analytic reviews showing low correspondence between informants' reports on child mental health [28].

#### **Analyses**

Data were analyzed using multivariate multilevel regression given the hierarchical structure of the data with children (Level 1) nested within schools (Level 2). Sampling weights were applied at the student and school levels based on the probability of selection. The multivariate regression models were estimated using full information maximum likelihood (FIML) with robust standard errors in Mplus version 7.11 [45]. All continuous predictor variables were grand-mean centred. To address research objective 1, we constructed a series of models to examine associations between neighbourhood and family level correlates and child mental health. Model 1 included neighbourhood structural characteristics (immigrant concentration, median income, unemployment, and neighbourhood social disorder). Model 2 added family socio-demographic

characteristics (parental refugee status, recency, English language proficiency, educational attainment, and household poverty). Model 3 added parental lifetime trauma exposure and perceived discrimination. Models 4 and 5 added parental distress and positive and negative parenting respectively. We controlled the False Discovery Rate (FDR) to account for multiple hypothesis testing. The FDR is the expected fraction of tests declared to be statistically significant when the null hypothesis is actually true [46]. The FDR approach sets a threshold for the *q*-value (typically 0.05) that specifies how many false positives are acceptable among all tests declared to be significant. *P*-values for each test were calculated and rank ordered in SPSS and those at or below the pre-determined *q*-value of 0.05 were deemed to be statistically significant for the purposes of our study.

To address research objective 2, we examined the change in coefficients associated with neighbourhood and family characteristics and parental exposure to trauma and discrimination after the addition of parental distress and parenting variables in Models 4 and 5. Finally, to address research objective 3 we ran Wald chi-square tests of differences in coefficients to compare the strength of association between each statistically significant correlate and parent versus child self-reports of internalizing and externalizing behaviors in Model 5. All models controlled for the age, sex (male), and 1<sup>st</sup> generation immigrant status of the child.

#### **Results**

Table 1 presents sample characteristics. Over half of the children in the sample (59.2%) were first-generation immigrants and over a quarter (28.2%) of families arrived in Canada as refugees. The majority (57.1%) of immigrant families in the sample were low income and a quarter of parents had a high school education or less. Tables 2 and 3 present the multivariate response models of parent and child-reported internalizing and externalizing problems respectively. We discuss below only the estimates that were significant after controlling for the FDR.

#### **Associations between neighborhood characteristics and parent and child-reported mental health**

Among the neighbourhood variables included in Model 1, neighbourhood social disorder was associated with higher levels of parent-reported internalizing ( $b=0.67$ ,  $p=0.002$ ) and externalizing problems ( $b=0.61$ ,  $p=0.004$ ). Higher neighbourhood immigrant concentration was associated with fewer parent-reported externalizing problems ( $b=-0.08$ ,  $p=0.001$ ).

**Table 1** Sample characteristics ( $n=943$ )

<i>Characteristic</i>		<i>Min, Max<sup>a</sup></i>
<i>Child</i>		
Age, <i>M (SD)</i>	12.22 (1.23)	9, 15
Male (%)	47.5	-
1st generation (%)	59.2	-
Externalizing problems—parent, <i>M (SD)</i>	44.45 (8.67)	33, 77
Externalizing problems—child, <i>M (SD)</i>	44.83 (9.79)	29, 84
Internalizing problems—parent, <i>M (SD)</i>	48.41 (10.82)	33, 84
Internalizing problems—child, <i>M (SD)</i>	51.27 (10.07)	27, 83
<i>Family</i>		
Below Low-Income Measure (LIM) (%)	57.1	-
Parental educational attainment (%)		
High school or less	24.6	-
Below Bachelor's	26.6	-
Bachelor's or above	48.8	-
Parental English fluency (%)		
Native speaker/fluent	38.8	-
Proficient	53.2	-
Poor	8.0	-
Parent arrived as refugee <sup>b</sup> (%)	28.2	-
Parent years in Canada, <i>M (SD)</i>	16.73 (12.33)	0, 59
Parental lifetime trauma exposure, <i>M (SD)</i>	1.75 (2.16)	0, 11
Parental perceived discrimination (%)		
High	22.4	-
Low	25.0	-
None	52.6	-
Parental distress, <i>M (SD)</i>	16.21 (6.81)	10, 50
Parenting behaviour		
Positive parenting—parent, <i>M (SD)</i>	46.22 (4.34)	29, 50
Positive parenting—child, <i>M (SD)</i>	44.69 (6.01)	10, 50
Negative parenting—parent, <i>M (SD)</i>	8.43 (2.81)	5, 20
Negative parenting—child, <i>M (SD)</i>	8.69 (2.92)	5, 24
<i>Neighbourhood</i>		
First generation immigrants, % ( <i>SD</i> )	34.17 (14.14)	-
Median household income (in thousands), <i>M (SD)</i>	68.37 (27.11)	21.22, 151.60
Unemployment rate, <i>M (SD)</i>	9.42 (8.75)	0, 46.20
Level of neighbourhood disorder, <i>M (SD)<sup>c</sup></i>	8.87 (1.60)	7, 19

*M* = Mean; *SD* = Standard deviation

<sup>a</sup> Minimum and maximum observed values

<sup>b</sup> Includes parents who arrived in Canada as a refugee, was or is currently a refugee claimant/ asylum seeker or has ever lived in a refugee camp

<sup>c</sup> Parent-reported neighbourhood disorder aggregated at the Census Dissemination Area

### Associations between family characteristics and parent and child-reported mental health

None of the family demographic variables included in Model 2 (i.e. parental refugee status, recency, English language proficiency, educational attainment, household poverty) were associated with either parent or child-reported internalizing or externalizing problems. In Models 3 and 4, more parental trauma exposure and

distress were each associated with higher levels of parent-reported internalizing ( $b=1.04$ ,  $p<0.001$  and  $b=0.44$ ,  $p<0.001$  respectively) and externalizing behaviors ( $b=0.98$ ,  $p<0.001$  and  $b=0.30$ ,  $p<0.001$  respectively). Finally, in Model 5 parent-reported positive parenting behaviour was associated with fewer parent-reported internalizing ( $b=-0.28$ ,  $p=0.018$ ) and externalizing ( $b=-0.29$ ,  $p=0.001$ ) problems. Parent-reported negative

**Table 2** Multivariate Response Model of Parent and Child-Reported Internalizing Problems, Weighted ( $n = 943$ )

Characteristic	Neighbourhood (Model 1)		Family demographics (Model 2)		Adverse life experiences (Model 3)		Parent distress (Model 4)		Parenting (Model 5)	
	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)
Fixed effects										
Intercept	48.06 (0.70)***	49.001 (0.696)***	46.06 (1.481)***	48.007 (0.849)***	45.7773 (1.609)***	48.3936 (0.896)***	46.566 (1.595)***	48.315 (0.909)***	46.405 (1.544)***	49.359 (0.836)***
Neighbourhood	-0.039 (0.04)	-0.012 (0.032)	-0.042 (0.038)	-0.013 (0.03)	-0.033 (0.04)	-0.011 (0.029)	-0.032 (0.037)	-0.011 (0.029)	-0.031 (0.035)	-0.005 (0.026)
% 1st generation immigrants	-0.022 (0.02)	-0.04 (0.021)	-0.005 (0.024)	-0.032 (0.02)	-0.005 (0.024)	-0.03 (0.02)	-0.003 (0.026)	-0.03 (0.02)	-0.017 (0.023)	-0.035 (0.015)*
Median family income (in thousands of dollars)	-0.045 (0.043)	0.133 (0.055)*	-0.062 (0.043)	0.13 (0.054)*	-0.08 (0.047)	0.124 (0.055)*	-0.06 (0.046)	0.126 (0.055)*	-0.066 (0.045)	0.11 (0.052)*^
Unemployment rate	0.666 (0.215)**	-0.054 (0.312)	<b>0.663 (0.216)**</b>	-0.08 (0.323)	<b>0.634 (0.217)**</b>	-0.034 (0.321)	<b>0.57 (0.232)*</b>	-0.042 (0.322)	0.406 (0.197)*	-0.025 (0.312)
Family socio-demographics										
Parent arrived in Canada as a refugee <sup>b</sup>	0.748 (0.948)	1.198 (1.004)	1.84 (0.948)	1.446 (1.033)	1.234 (0.909)	1.376 (1.046)	1.097 (0.91)	1.248 (0.989)		
Years patient living in Canada	0.04 (0.08)	-0.026 (0.058)	0.045 (0.076)	-0.025 (0.056)	0.041 (0.075)	-0.026 (0.056)	0.009 (0.075)	0.009 (0.075)	-0.012 (0.06)	
Parent										
English language proficiency <sup>c</sup>	0.827 (1.539) 0.71 (0.866)	-2.644 (1.245)* -0.084 (0.935)	1.271 (1.421) 0.911 (0.931)	-2.608 (1.213)* -0.024 (0.947)	0.149 (1.448) 0.385 (0.911)	-2.642 (1.224)* -0.021 (0.953)	-0.177 (1.408) 0.266 (0.801)	-0.177 (1.408) 0.491 (0.732)	-2.447 (1.26) 0.646 (0.696)	
Parent educational attainment <sup>d</sup>	1.989 (1.05)	0.55 (0.88)	1.987 (1.005)*	0.352 (0.912)	1.652 (1.001)	0.341 (0.923)	1.748 (0.993)	1.748 (0.993)	1.213 (0.781)	
High school or less	1.94 (1.304)	1.381 (0.908)	1.682 (1.284)	1.25 (0.911)	1.489 (1.252)	1.261 (0.922)	1.332 (1.20)	1.332 (1.20)	1.485 (0.866)	
Below Bachelor's	2.142 (1.013)*	1.941 (0.797)*	1.395 (1.013)	1.779 (0.788)*	0.394 (0.991)	1.711 (0.768)*				
Household below Low Income Measure (LIM)										
Adverse life experiences										
Parental lifetime trauma exposure										
Parental perceived discrimination (high)	1.37 (1.105)	-1.44 (1.177)	0.499 (1.141)	-1.465 (1.206)	0.461 (1.161)	-1.257 (0.871)				

**Table 2** (continued)

Characteristic	Neighbourhood (Model 1)		Family demographics (Model 2)		Adverse life experiences (Model 3)		Parent distress (Model 4)		Parenting (Model 5)	
	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)
Parental perceived discrimination (low)					1.623 (0.689)*	0.809 (1.055)	1.415 (0.742)	0.838 (1.059)	1.272 (0.695)	0.406 (0.945)
Parental distress							<b>0.435 (0.068)***</b>	0.038 (0.053)	<b>0.356 (0.063)***</b> <sup>a</sup>	0.006 (0.051)
Parenting									<b>-0.316 (0.127)*</b> <sup>a</sup>	-0.039 (0.098)
Positive (parent report)									-0.008 (0.062)	<b>-0.335 (0.088)***</b> <sup>a</sup>
Positive (child report)									<b>0.5 (0.196)*</b>	0.171 (0.165)
Negative (parent report)										<b>1.063 (0.206)***</b> <sup>a</sup>
Negative (child report)										0.071 (0.147)
Covariates										
Child age	-0.021 (0.333)	0.694 (0.319)*	-0.092 (0.327)	0.739 (0.326)*	-0.281 (0.325)	0.708 (0.312)*	-0.088 (0.336)	0.726 (0.309)*	-0.181 (0.384)	0.314 (0.283)
Child sex (male)	1.008 (0.761)	<b>2.087 (0.949)*</b>	1.087 (0.737)	<b>2.196 (0.935)*</b>	1.325 (0.678)	<b>2.219 (0.923)*</b>	<b>1.781 (0.624)**</b>	<b>2.301 (0.914)*</b>	<b>1.447 (0.577)*</b>	0.775 (0.794)
Child immigrant	-0.409 (0.741)	2.023 (0.785)**	-1.331 (1.134)	1.897 (1.038)	-1.046 (1.213)	1.806 (1.029)	-0.82 (1.203)	1.883 (1.039)	-0.56 (1.254)	1.101 (0.888)
Random effects										
Level 2: School	3.692 (1.835)*	3.17 (1.276)*	3.685 (2.005)	2.763 (1.236)*	3.876 (2.009)	2.572 (1.119)*	3.79 (1.935)*	2.535 (1.105)*	4.088 (2.068)*	2.043 (0.924)*
Level 1: Child	101.37 (6.70)***	91.97 (5.141)***	90.589 (4.916)***	99.265 (6.785)***	93.946 (7.256)***	90.027 (4.85)***	86.976 (7.18)***	90.033 (4.882)***	81.916 (7.425)***	71.298 (4.649)***

Bolded values denote significant coefficients after controlling the False Discovery Rate (FDR) ( $q$ -value of 0.05). \* $p$  < .05, \*\* $p$  < .01, \*\*\* $p$  < .001. <sup>a</sup> denotes a significant difference in parent and child-reported coefficients. All coefficients are unstandardized

<sup>a</sup> Parent-reported neighbourhood disorder aggregated at the Census Dissemination Area

<sup>b</sup> Includes parents who arrived in Canada as a refugee, was or is currently a refugee, claimant/asylum seeker, or has ever lived in a refugee camp

<sup>c</sup> Reference group for the variable parental English language proficiency was "fluent/native"

<sup>d</sup> Reference group for the variable parental educational attainment was "Bachelor's or above"

**Table 3** Multivariate Response Model of Parent and Child-Reported Externalizing Problems, Weighted ( $n = 943$ )

Characteristic	Neighbourhood (Model 1)		Family demographics (Model 2)		Adverse life experiences (Model 3)		Parent distress (Model 4)		Parenting (Model 5)	
	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)
<i>Fixed effects</i>										
Intercept	43.577 (0.514)***	43.554 (0.598)***	43.032 (1.1)***	42.81 (0.859)***	42.696 (1.105)***	43.447 (0.754)***	43.426 (1.072)***	43.532 (0.751)***	51.669 (2.197)***	60.642 (4.235)***
Neighbourhood	<b>-0.077 (0.023)***</b>	-0.043 (0.029)	<b>-0.066 (0.022)**</b>	-0.048 (0.031)	<b>-0.058 (0.022)*</b>	-0.044 (0.03)	<b>-0.056 (0.021)**</b>	-0.045 (0.029)	<b>-0.052 (0.018)**</b>	-0.031 (0.021)
% 1st generation immigrants	0.024 (0.018)	-0.013 (0.018)	0.036 (0.018)*	-0.009 (0.019)	0.036 (0.018)*	-0.007 (0.018)	0.037 (0.018)*	-0.007 (0.018)	0.021 (0.014)	-0.014 (0.017)
Median family income (in thousands of dollars)	Unemployment rate	0.032 (0.032)	0.077 (0.043)	0.016 (0.029)	0.076 (0.044)	-0.001 (0.027)	0.067 (0.044)	0.014 (0.026)	0.069 (0.044)	0.005 (0.023)
Neighbourhood disorder <sup>a</sup>	<b>0.607 (0.208)**</b>	-0.148 (0.26)	<b>0.575 (0.199)***</b>	-0.161 (0.273)	<b>0.518 (0.204)*</b>	-0.114 (0.278)	0.484 (0.21)*	-0.111 (0.269)	0.300 (0.167)	-0.105 (0.249)
Family socio-demographics										
Parent arrived in Canada as a refugee <sup>b</sup>	Parent arrived in Canada as a refugee <sup>b</sup>	0.091 (0.74)	0.013 (0.774)	-0.919 (0.759)	-0.439 (0.835)	-0.492 (0.687)	-0.388 (0.835)	-0.264 (0.636)	-0.283 (0.686)	
Years parent living in Canada	Years parent living in Canada	0.094 (0.057)	-0.035 (0.072)	0.094 (0.053)	-0.042 (0.066)	0.091 (0.052)	-0.043 (0.066)	0.055 (0.050)	-0.030 (0.068)	
Parental English language proficiency <sup>c</sup>										
Poor	Poor	0.406 (1.172)	-0.61 (2.161)	-0.024 (1.063)	-0.71 (2.071)	-0.885 (1.08)	-0.816 (2.07)	-0.816 (2.07)	-1.034 (0.967)	-0.404 (1.565)
Proficient	Proficient	-0.18 (0.722)	0.044 (0.978)	0.02 (0.747)	0.138 (0.958)	-0.402 (0.783)	0.086 (0.943)	0.086 (0.943)	-0.441 (0.627)	0.717 (0.663)
Parental educational attainment <sup>d</sup>										
High school or less	High school or less	1.897 (0.916)*	0.086 (1.103)	1.858 (0.875)*	-0.252 (1.172)	1.615 (0.877)	-0.268 (1.196)	1.861 (0.888)*	0.194 (0.895)	
Below Bachelor's	Below Bachelor's	1.433 (1.046)	0.476 (0.769)	1.206 (0.971)	0.274 (0.805)	1.064 (0.943)	0.288 (0.816)	0.913 (0.942)	0.22 (0.736)	
Household below Low Income Measure (LIM)	Household below Low Income Measure (LIM)	1.316 (0.914)	0.657 (0.951)	0.723 (0.878)	0.527 (0.88)	-0.016 (0.849)	0.458 (0.851)	0.458 (0.777)	0.215 (0.774)	
Adverse life experiences										
Parental lifetime trauma exposure	Parental lifetime trauma exposure		<b>0.979 (0.138)***</b>	0.383 (0.219)	<b>0.75 (0.133)***</b>	0.364 (0.217)	<b>0.661 (0.129)***</b>	0.330 (0.190)		
Parental perceived discrimination (high)	Parental perceived discrimination (high)		1.27 (0.724)	-2.252 (1.225)	0.626 (0.746)	-2.311 (1.254)	0.627 (0.69)	-2.002 (1.138)		
Parental perceived discrimination (low)	Parental perceived discrimination (low)		1.111 (0.641)	0.491 (0.902)	0.959 (0.686)	0.513 (0.907)	0.741 (0.621)	0.035 (0.710)		
Parental distress	Parental distress				<b>0.304 (0.054)***</b>	<b>0.027 (0.052)</b>	<b>0.205 (0.051)***</b>	-0.014 (0.044)		

**Table 3** (continued)

Characteristic	Neighbourhood (Model 1)		Family demographics (Model 2)		Adverse life experiences (Model 3)		Parent distress (Model 4)		Parenting (Model 5)	
	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)	Parent ( <i>b</i> , SE)	Child ( <i>b</i> , SE)
										Parenting
Parenting										
Positive (parent report)									<b>-0.310</b> <b>(0.087)***^</b>	-0.024 (0.093)
Positive (child report)									<b>-0.266 (0.080)***</b>	-0.061 (0.043)
Negative (parent report)									<b>0.709</b> <b>(0.110)***^</b>	<b>0.296 (0.132)*</b>
Negative (child report)									<b>0.261 (0.112)*</b>	<b>1.271 (0.140)***^</b>
Covariates										
Child age	-0.317 (0.252)	<b>1.49 (0.288)***</b>	-0.418 (0.26)	<b>1.527 (0.284)***</b>	<b>-0.575 (0.253)*</b>	<b>1.497 (0.287)***</b>	-0.454 (0.264)	<b>1.493 (0.286)***</b>	<b>-0.595 (0.240)*</b>	<b>1.101 (0.292)***^</b>
Child sex (male)	0.378 (0.679)	1.234 (0.599)*	0.461 (0.637)	1.216 (0.663)*	0.69 (0.572)	1.234 (0.582)*	0.953 (0.544)	1.242 (0.599)*	0.424 (0.449)	-0.308 (0.511)
Child immigrant status (1st generation)	1.072 (0.74)*	-0.654 (0.923)	1.072 (0.74)	1.52 (0.939)	-0.243 (0.91)	1.581 (0.984)	-0.181 (0.912)	1.554 (0.984)	0.059 (0.902)	0.824 (0.917)
Random effects										
Level 2: School	0.415 (1.224)		1.62 (1.73)	0.753 (1.487)	1.564 (1.81)	0.883 (1.545)	1.467 (1.772)	0.776 (1.081)	1.257 (1.553)	1.303 (0.956)
Level 1: Child	70.481 (3.861)***	84.422 (5.333)***	68.687 (3.325)***	84.246 (5.288)***	64.08 (3.236)***	82.849 (5.118)***	60.679 (3.153)***	83.014 (5.145)***	43.261 (1.006)***	44.424 (0.826)***

Bolded values denote significant coefficients after controlling the False Discovery Rate (FDR) (*q*-value of 0.05). \**p*<.05, \*\**p*<.01, \*\*\**p*<.001. ^ denotes a significant difference in parent and child-reported coefficients. All coefficients are unstandardized

a Parent-reported neighbourhood disorder aggregated at the Census Dissemination Area

b Includes parents who arrived in Canada as a refugee, was or is currently a refugee, claimant/asylum seeker, or has ever lived in a refugee camp

c Reference group for the variable parental English language proficiency was "fluent/native"

d Reference group for the variable parental educational attainment was "Bachelor's or above"

parenting was associated with more parent-reported internalizing problems ( $b=0.69, p=0.020$ ), as well as higher levels of both parent and child-reported externalizing problems ( $b=0.78, p=0.001$  and  $b=0.53, p=0.013$  respectively). Child reports of positive and negative parenting behaviour were the only other significant correlates of child self-reported internalizing and externalizing problems. Child-reported positive parenting was associated with fewer self-reported internalizing ( $b=-0.31, p=0.084$ ) and externalizing ( $b=-0.22, p=0.001$ ) problems, while child reports of negative parenting were associated with higher levels of self-reported internalizing ( $b=1.30, p<0.001$ ) and externalizing problems ( $b=1.65, p<0.001$ ).

Adding the parental distress and parenting variables in Model 5 reduced the coefficients for neighbourhood disorder by 36.0% from 0.63 to 0.41 for parent-reported internalizing problems, and by 42.1% from 0.52 to 0.30 for parent-reported externalizing problems and rendered the associations non-significant. The coefficients for parental trauma exposure were also reduced by 37.2% from 1.04 to 0.65 for parent-reported internalizing problems, and by 32.5% from 0.98 to 0.66 for parent-reported externalizing problems. However, the association between parental trauma exposure and parent ratings of their children's internalizing and externalizing problems remained significant.

#### Inter-informant variation in mental health correlates

Results showed few significant correlates of child-reported internalizing and externalizing problems, with only positive and negative parenting exhibiting associations with child self-reports. As described above, neighbourhood social disorder, immigrant concentration, parental trauma, and parental distress were significant correlates of parent but not child reports of internalizing and externalizing problems. Only parent and child-reported negative parenting behaviour exhibited cross-informant associations with externalizing problems. Formal tests of differences in the strength of associations across parent and child informants revealed substantial variation in the links between family factors and parent and child mental health ratings. Parental trauma exposure, parental distress, and parent-reported positive parenting were more strongly associated with parent compared to child-reported internalizing problems, while child-reported positive and negative parenting were more strongly associated with child compared to parent-reported internalizing problems. For externalizing problems, parental distress and parent-reported positive and negative parenting were more strongly associated with parent than child-reported scores, while

child-reported negative parenting and age were more strongly associated with child than parent-reported scores.

#### Discussion

This study used data from a diverse probability-based sample of immigrant children and their caregivers to examine associations between characteristics of neighbourhood and family contexts and children's mental health. Overall, results showed that negative parenting behaviour was consistently associated with higher levels of parent- and child-reported internalizing and externalizing problems, while positive parenting behaviour was associated with lower levels. In addition, neighbourhood social disorder, parental trauma exposure, and parental distress were associated with higher levels of parent-reported internalizing and externalizing problems, while neighbourhood immigrant concentration were associated with fewer parent-reported externalizing problems. Apart from parenting behaviour, there were few significant correlates of child-reported mental health with only male gender and age being associated with greater internalizing and externalizing problems respectively. The majority of significant correlates were informant-specific, with only negative parenting demonstrating significant cross-informant associations with externalizing problems.

Results showing the importance of parenting behaviour for immigrant children's mental health are consistent with the large body of evidence on associations between parenting and common mental disorders among general population and immigrant samples [47, 48]. Inclusion of parental distress and parenting behaviours reduced the associations of more distal family and neighbourhood level correlates, including parental trauma exposure and neighbourhood social disorder. While the cross-sectional nature of the data precludes formal testing of mediation effects, our results are consistent with the Family Stress Model and growing evidence of pathways between socio-economic stressors, parental distress, harsh parenting, and poor mental health outcomes among immigrant and refugee children [49, 50]. Associations between parental trauma exposure and distress and parent reports of child mental health problems remained significant after the inclusion of parenting variables in the model, which suggests other potential mechanisms beyond the broad dimensions of positive and negative parenting assessed in this study. Respondent bias may also partially account for these informant-specific associations, given evidence that parents who have experienced trauma and distress may report more negatively on their children's mental health [51].

As in previous research [4], higher neighbourhood-level immigrant concentration was consistently associated with fewer parent-reported externalizing problems. It has been hypothesized that living in a neighbourhood with immigrants of similar socioeconomic, ethno-cultural, or migration backgrounds may confer a protective effect by enhancing social support and collective efficacy [17]. On the other hand, family socio-demographic characteristics widely assumed to be risk factors for children's poor mental health such as household poverty and refugee background were not found to be significant correlates in this study. Extant research on mental health risk associated with refugee status is mixed, with some studies showing comparable levels of mental health between refugee children and the general population while others indicating elevated risk among refugees [15, 52]. Given significant heterogeneity in exposures to mental health stressors among immigrant and refugee groups, adverse migration experiences may be a more sensitive risk factor for poor outcomes than broad categorisations of immigrant versus refugee status. Notably, a representative survey with adult refugees and immigrants in the United States found that pre- and post-migration trauma was associated with mental distress and illness across both groups irrespective of immigrant class [7].

Consistent with previous research [53], household low-income status was not a significant correlate of mental health despite immigrant children being significantly more likely to live in poverty. This paradox may be explained by immigrants' social and cultural resources such as the retention of cultural values and practices that protect against the adverse effects of poverty [54]. In the current study, stratified sampling methods to increase representation of immigrant children resulted in a sample that was skewed towards a restricted and lower range of household income, which may also contribute to our present findings.

Finally, the predominantly informant-specific associations found in this study as well as the few significant correlates of child self-reported mental health merit further investigation with immigrant samples. Previous research suggests that parent-child discrepancies in mental health ratings and their associations with neighbourhood and family correlates may be more pronounced among immigrant families due to divergent cultural expectations about parenting and child adjustment [29]. Substantial inter-informant variation in associations of almost all mental health correlates highlights the risk of relying on single informant assessments among immigrant samples. Future research with immigrant and refugee groups, particularly research aimed at identifying targets for intervention, should devote greater attention to the collection, interpretation, and integration of multi-informant data to avoid misidentification of mental health correlates in this population.

### Strengths and limitations

Strengths of the study include the use of a probabilistic, ethnically and linguistically diverse community sample of immigrant children and inclusion of a broad spectrum of migration-specific and universal mental health correlates in the neighbourhood and family contexts. Multi-informant data enabled systematic testing of the extent to which mental health correlates differed between parents and children. Study limitations include the cross-sectional nature of the study design, which precludes causal inferences and formal testing for mediation effects. Skewness of several study variables (e.g., parental English fluency) may have reduced the reliability of certain estimates, as shown by their larger standard errors. While many of the study measures have been widely used with diverse ethnocultural groups, there is limited evidence on their psychometric properties in immigrant and refugee samples specifically [55]. A validity study of the CBCL/YSR with Somali refugees, for instance, found excellent internal consistency reliability but poor criterion validity for the YSR, highlighting the need for rigorous psychometric evaluation of standardized instruments when administered to diverse immigrant and refugee groups [56]. Future studies on immigrant child and youth mental health would benefit from further investigation of the cross-cultural validity of these measures, while also addressing potential method effects (e.g., positively worded versus negatively worded items) and measurement error through structural equation modelling methods. Finally, while concept coverage was broad within the neighbourhood and family contexts, our models did not include other important contextual factors that influence child mental health such as school environment and peer relationships.

### Conclusions

This study shows that parenting behaviour, parental distress, and parental exposure to trauma are important correlates of immigrant children's mental health. While not unique to immigrants, the primacy of these processes for immigrant children and families warrants particular attention given the heightened risk of exposure to migration-related adverse experiences that threaten parental and family well-being. To prevent or mitigate cascading effects on child mental health, it is imperative to invest in developing and testing trauma-informed and culturally responsive mental health and parenting interventions for immigrant families [57]. Triangulation of information from multiple informants is crucial when conducting research to identify targets for intervention, as significant variation in parent and child-reported correlates may result in misidentification of neighbourhood and family factors that matter most for immigrant children's mental health.

## Acknowledgements

The authors thank Li Wang for support in statistical analysis. We are grateful to all the families who participated in the Hamilton Youth Study.

## Authors' contributions

AS and KG conceptualized and designed the study and conducted data analysis and interpretation. AS wrote the first draft of the manuscript. All authors commented on previous versions of the manuscript and read and approved the final manuscript.

## Funding

The Hamilton Youth Study was supported by a Canadian Institutes of Health Research (CIHR) grant to Dr. Katholiki Georgiades. Dr. Georgiades is supported by the David R. (Dan) Offord Chair in Child Studies.

## Availability of data and materials

The data that support the findings of this study are not publicly available due to inclusion of information that could compromise participant privacy. The variance–covariance matrix and code used in the study can be made available upon request for research purposes only.

## Declarations

### Ethics approval and consent to participate

Approval was obtained from the Hamilton Integrated Research Ethics Board (HiREB). The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Parental informed consent and child assent were obtained from all individual participants included in the study prior to data collection.

### Consent for publication

Not applicable.

### Competing interests

The authors declare that they have no competing interests.

Received: 10 March 2022 Accepted: 24 June 2022

Published online: 05 July 2022

## References

- Masten AS, Motti-Stefanidi F, Rahl-Brigman HA. Developmental risk and resilience in the context of devastation and forced migration. In: Parke RD, Elder GH, editors. *Children in changing worlds: Sociocultural and temporal perspectives*. New York: Cambridge University Press; 2019. p. 84–111.
- Motti-Stefanidi F, Pavlopoulos V, He J. Immigrant youth resilience: theoretical considerations, empirical developments, and future directions. *J Res Adolesc*. 2021;31(4):966–88.
- Statistics Canada. Focus on Geography Series, 2016 Census: Immigration and ethnocultural diversity. Ottawa: Statistics Canada; 2017. Updated 2020. <https://www12.statcan.gc.ca/census-recensement/2016/rt-td/imm-eng.cfm>. Accessed 15 Jan 2022.
- Georgiades K, Boyle MH, Duku E. Contextual influences on children's mental health and school performance: the moderating effects of family immigrant status. *Child Dev*. 2007;78(5):1572–91.
- Visser K, Bolt G, Finkenauer C, Jonker M, Weinberg D, Stevens GWJM. Neighbourhood deprivation effects on young people's mental health and well-being: a systematic review of the literature. *Soc Sci Med*. 2021;270: 113542.
- Reiss F. Socioeconomic inequalities and mental health problems in children and adolescents: a systematic review. *Soc Sci Med*. 2013;90:24–31.
- Sangalang CC, Becerra D, Mitchell FM, Lechuga-Peña S, Lopez K, Kim I. Trauma, post-migration stress, and mental health: a comparative analysis of refugees and immigrants in the United States. *J Immigr Minor Heal*. 2019;21(5):909–19.
- Suárez-Orozco C, Motti-Stefanidi F, Marks A, Katsiaficas D. An integrative risk and resilience model for understanding the adaptation of immigrant-origin children and youth. *Am Psychol*. 2018;73(6):781–96.
- Bronfenbrenner U, Morris PA. The bioecological model of human development. In: Damon W, Lerner RM, editors. *Handbook of child psychology*. Hoboken, NJ: Wiley; 2007. p. 793–828.
- Kohen DE, Leventhal T, Dahinten VS, McIntosh CN. Neighborhood disadvantage: Pathways of effects for young children. *Child Dev*. 2008;79(1):156–69.
- Wang X, Maguire-Jack K, Barnhart S, Yoon S, Li Q. Racial differences in the relationship between neighborhood disorder, adverse childhood experiences, and child behavioral health. *J Abnorm Child Psychol*. 2020;48(3):315–29.
- Lee MJ, Liechty JM. Longitudinal associations between immigrant ethnic density, neighborhood processes, and latino immigrant youth depression. *J Immigr Minor Heal*. 2015;17(4):983–91.
- Lara-Cinisomo S, Xue Y, Brooks-Gunn J. Latino youth's internalising behaviours: links to immigrant status and neighbourhood characteristics. *Ethn Heal*. 2013;18(3):315–35.
- Beiser M, Hamilton H, Rummens JA, Oxman-Martinez J, Ogilvie L, Humphrey C, et al. Predictors of emotional problems and physical aggression among children of Hong Kong Chinese, Mainland Chinese and Filipino immigrants to Canada. *Soc Psychiatry Psychiatr Epidemiol*. 2010;45(10):1011–21.
- Lau W, Silove D, Edwards B, Forbes D, Bryant R, McFarlane A, et al. Adjustment of refugee children and adolescents in Australia: outcomes from wave three of the building a new life in Australia study. *BMC Med*. 2018;16(1):1–17.
- Lerner JV, Lerner RM. Temperament and adaptation across life: Theoretical and empirical issues. In: Baltes PB, Brim OG, editors. *Life-span development and behavior*. New York: Academic Press; 1983. p. 197–230.
- Coll CG, Szalacha LA. The multiple contexts of middle childhood. *Futur Child*. 2004;14(2):81–97.
- Li M, Johnson SB, Musci RJ, Riley AW. Perceived neighborhood quality, family processes, and trajectories of child and adolescent externalizing behaviors in the United States. *Soc Sci Med*. 2017;192:152–61.
- Conger RD, Conger KJ, Martin MJ. Socioeconomic status, family processes, and individual development. *J Marriage Fam*. 2010;72(3):685–704.
- White RMB, Liu Y, Nair RL, Tein JY. Longitudinal and integrative tests of family stress model effects on Mexican origin adolescents. *Dev Psychol*. 2015;51(5):649–62.
- Masarik AS, Conger RD. Stress and child development: a review of the family stress model. *Curr Opin Psychol*. 2017;13:85–90.
- Narayan AJ, Lieberman AF, Masten AS. Intergenerational transmission and prevention of adverse childhood experiences (ACEs). *Clin Psychol Rev*. 2021;85: 101997.
- Lebrun A, Hassan G, Boivin M, Fraser SL, Dufour S, Lavergne C. Review of child maltreatment in immigrant and refugee families. *Can J Public Heal*. 2015;106(7):eS45–56.
- Coll CG, Lamberty G, Jenkins R, Mcadoo HP, Crnic K, Wasik BH, et al. An integrative model for the study of developmental competencies in minority children. *Child Dev*. 1996;67(5):1891–914.
- Yoshikawa H, Aber JL, Beardslee WR. The effects of poverty on the mental, emotional, and behavioral health of children and youth: implications for prevention. *Am Psychol*. 2012;67(4):272–84.
- Coll CG, Marks AK. The immigrant paradox in children and adolescents: Is becoming American a developmental risk? American Psychological Association. 2012.
- Beiser M, Goodwill AM, Albanese P, McShane K, Nowakowski M. Predictors of immigrant children's mental health in Canada: selection, settlement contingencies, culture, or all of the above? *Soc Psychiatry Psychiatr Epidemiol*. 2014;49(5):743–56.
- De Los RA, Augenstein TM, Wang M, Thomas SA, Drabick DA, Burgers DE, Rabinowitz J. The validity of the multi-informant approach to assessing child and adolescent mental health. *Psychol Bull*. 2015;141(4):858.
- Fung JJ, Lau AS. Factors associated with parent-child (dis)agreement on child behavior and parenting problems in Chinese immigrant families. *J Clin Child Adolesc Psychol*. 2010;39(3):314–27.
- Collishaw S, Goodman R, Ford T, Rabe-Hesketh S, Pickles A. How far are associations between child, family and community factors and child psychopathology informant-specific and informant-general? *J Child Psychol Psychiatry Allied Discip*. 2009;50(5):571–80.
- Statistics Canada. *Census Profile, 2016 Census - Hamilton, City [Census subdivision], Ontario and Hamilton, Census division [Census division]*,

- Ontario. Ottawa: Statistics Canada; 2016. <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=3525005&Geo2=CD&Code2=3525&Data=Count&SearchType=Begins&SearchPR=01&B1>All>. Accessed 15 Jan 2022.
32. Statistics Canada. National Household Survey User Guide. Ottawa: Statistics Canada; 2011. [https://www12.statcan.gc.ca/nhs-enm/2011/ref\\_nhs-enm\\_guide/index-eng.cfm](https://www12.statcan.gc.ca/nhs-enm/2011/ref_nhs-enm_guide/index-eng.cfm). Accessed 15 Jan 2022.
  33. Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science*. 1997;277(5328):918–24.
  34. Statistics Canada. Low-income measures thresholds (LIM-AT, LIM-BT and LIM-MI) for households of Canada, 2010. Ottawa: Statistics Canada; 2010. <https://www12.statcan.gc.ca/nhs-enm/2011/ref/dict/table-tableau/t-3-2-eng.cfm>. Accessed 15 Jan 2022.
  35. Mollica RF, Caspi-Yavin Y, Bollini P, Truong T, Tor S, Lavelle J. The Harvard Trauma Questionnaire: Validating a cross-cultural instrument for measuring torture, trauma, and posttraumatic stress disorder in Indochinese refugees. *J Nerv Ment Dis*. 1992;180(2):111–6.
  36. Sigvardsson E, Malm A, Tinghög P, Vaez M, Saboonchi F. Refugee trauma measurement: a review of existing checklists. *Public Health Rev*. 2016;37:10.
  37. Steel Z, Chey T, Silove D, Marnane C, Bryant RA, van Ommeren M. Association of torture and other potentially traumatic events with mental health outcomes among populations exposed to mass conflict and displacement: a systematic review and meta-analysis. *JAMA*. 2009;302(5):537–49.
  38. Krieger N, Smith K, Naishadham D, Hartman C, Barbeau EM. Experiences of discrimination: Validity and reliability of a self-report measure for population health research on racism and health. *Soc Sci Med*. 2005;61(7):1576–96.
  39. Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfroerer JC, Hiripi E, et al. Screening for serious mental illness in the general population. *Arch Gen Psychiatry*. 2003;60(2):184–9.
  40. Fassaert T, De Wit M, Tuinebreijer W, Wouters H, Verhoeff A, Beekman A, Dekker J. Psychometric properties of an interviewer-administered version of the Kessler Psychological Distress scale (K10) among Dutch, Moroccan and Turkish respondents. *Int J Methods Psychiatr Res*. 2009;18:159–68.
  41. Lovejoy MC, Weis R, O'Hare E, Rubin EC. Development and initial validation of the Parent Behavior Inventory. *Psychol Assess*. 1999;11(4):534–45.
  42. Statistics Canada. National Longitudinal Survey of Children and Youth (NLSCY). Ottawa: Statistics Canada; 2010. <https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&Id=56797>. Accessed 15 Jan 2022.
  43. Achenbach TM, Edelbrock CS. Behavioral problems and competencies reported by parents of normal and disturbed children aged four through sixteen. *Monogr Soc Res Child Dev*. 1981;46(1):1–82.
  44. Rescorla L, Ivanova MY, Achenbach TM, Begovac I, Chahed M, Drugli MB, Emerich DR, Fung DS, Haider M, Hansson K, Hewitt N. International epidemiology of child and adolescent psychopathology II: integration and applications of dimensional findings from 44 societies. *J Am Acad Child Adolesc Psychiatry*. 2012;51(12):1273–83.
  45. Muthén LK, Muthén BO. Mplus User's Guide. 6th ed. Los Angeles: Muthén & Muthén; 2010.
  46. Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J Roy Stat Soc: Ser B (Methodol)*. 1995;57:289–300.
  47. McLeod BD, Weisz JR, Wood JJ. Examining the association between parenting and childhood depression: a meta-analysis. *Clin Psychol Rev*. 2007;27(8):986–1003.
  48. Vitoroulis I, Sim A, Ma S, Jenkins J, Georgiades K. Resilience in the Face of Adversity: Family Processes and the Immigrant Paradox in Youth Externalizing Problems. *Canadian J Psychiatry*. 2022. <https://doi.org/10.1177/07067437211065722>.
  49. Flink IJ, Jansen PW, Beirens TM, Tiemeier H, Van IJzendoorn MH, Jaddoe VW, et al. Differences in problem behaviour among ethnic minority and majority preschoolers in the Netherlands and the role of family functioning and parenting factors as mediators: the generation R study. *BMC Public Health*. 2012;12(1):1.
  50. Eltanamly H, Leijten P, Jak S, Overbeek G. Parenting in times of war: a meta-analysis and qualitative synthesis of war exposure, parenting, and child adjustment. *Trauma, Violence, Abus*. 2021;22(1):147–60.
  51. Offord DR, Boyle MH, Racine Y, Szatmarijan P, Fleming JE, Lipman EL, et al. Integrating assessment data from multiple informants. *J Am Acad Child Adolesc Psychiatry*. 1996;35(8):1078–85.
  52. Bronstein I, Montgomery P. Psychological distress in refugee children: a systematic review. *Clin Child Fam Psychol Rev*. 2011;14(1):44–56.
  53. Beiser M, Hou F, Hyman I, Tousignant M. Poverty, family process, and the mental health of immigrant children in Canada. *Am J Public Health*. 2002;92(2):220–7.
  54. Milbrath C, Guhn M. Neighbourhood culture and immigrant children's developmental outcomes at kindergarten. *Early Child Res Q*. 2019;48:198–214.
  55. Paalman CH, Terwee CB, Jansma EP, Jansen LMC. Instruments measuring externalizing mental health problems in immigrant ethnic minority youths: a systematic review of measurement properties. *PloS One*. 2013;8(5):e63109.
  56. Hall BJ, Puffer E, Murray LK, et al. The importance of establishing reliability and validity of assessment instruments for mental health problems: an example from somali children and adolescents living in three refugee camps in Ethiopia. *Psychol Inj and Law*. 2014;7:153–64.
  57. Betancourt TS, Berent JM, Freeman J, Frounfelker RL, Brennan RT, Abdi S, et al. Family-based mental health promotion for somali bantu and bhutanese refugees: feasibility and acceptability trial. *J Adolesc Heal*. 2020;66(3):336–44.

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

**Ready to submit your research? Choose BMC and benefit from:**

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

**At BMC, research is always in progress.**

Learn more [biomedcentral.com/submissions](http://biomedcentral.com/submissions)

