

# Missed opportunities: childhood learning disabilities as early indicators of risk among homeless adults with mental illness in Vancouver, British Columbia

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## ABSTRACT

**Objectives:** It is well documented that early-learning problems and poor academic achievement adversely impact child development and a wide range of adult outcomes; however, these indicators have received scant attention among homeless adults. This study examines self-reported learning disabilities (LD) in childhood as predictors of duration of homelessness, mental and substance use disorders, physical health, and service utilisation in a sample of homeless adults with current mental illness.

**Design:** This study was conducted using the baseline sample from a randomised controlled trial (RCT).

**Setting:** Participants were sampled from the community in Vancouver, British Columbia.

**Participants:** The total sample included 497 adult participants who met criteria for absolute homelessness or precarious housing and a current mental disorder based on a structured diagnostic interview. Learning disabilities in childhood were assessed by asking adult participants whether they thought they had an LD in childhood and if anyone had told them they had an LD. Only participants who responded positively to both questions (n=133) were included in the analyses.

**Outcome measures:** Primary outcomes include current mental disorders, substance use disorders, physical health, service utilisation and duration of homelessness.

**Results:** In multivariable regression models, self-reported LD during childhood independently predicted self-reported educational attainment and lifetime duration of homelessness as well as a range of mental health, physical health and substance use problems, but did not predict reported health or justice service utilisation.

**Conclusions:** Childhood learning problems are overrepresented among homeless adults with complex comorbidities and long histories of homelessness. Our findings are consistent with a growing body of literature indicating that adverse childhood events are potent risk factors for a number of adult health and psychiatric problems, including substance abuse.

## ARTICLE SUMMARY

### Article focus

- The relationship between self-reported learning disability (LD) in childhood as a predictor of adult homelessness and associated health and service use outcomes among a cohort of adults who are homeless and have a mental disorder.
- Primary outcomes include current mental disorders, substance use disorders, physical health, service utilisation and duration of homelessness.
- How homelessness and the myriad of associated negative health and social outcomes might be prevented.

### Key messages

- Childhood LD are over-represented among homeless adults with complex comorbidities and predict a range of poor health outcomes in adulthood, including mood and anxiety disorders, suicidal ideation, early and severe substance use and physical health problems.
- Early risk factors are often longstanding and drive a trajectory of cumulative risk, potentially leading to severe psychopathology and social exclusion.

### Strengths and limitations of this study

- Strengths include a large sample size, a diverse recruitment strategy and structured diagnostic interviews for mental disorders.
- Limitations include retrospective self-report of childhood LD.
- Lack of access to early trauma and family dysfunction variables as well as measures of general cognitive impairment at baseline.

**Trials registration number:** This trial has been registered with the International Standard Randomised Control Trial Number Register and assigned ISRCTN42520374.

## INTRODUCTION

Efforts to prevent homelessness require an understanding of the underlying causes and early indicators of risk. Research into the causes of homelessness suggests complex interactions between structural and individual factors, both of which are often present long before the onset of first homelessness.<sup>1–2</sup> The childhoods of homeless adults are disproportionately characterised by persistent poverty, residential mobility, school problems and other stressful and/or traumatic experiences<sup>3–5</sup> particularly among homeless individuals with severe mental illness.<sup>2</sup>

While a growing body of research has examined the relationship between adverse childhood events and subsequent homelessness,<sup>3–4</sup> few studies have examined the role of childhood learning disabilities (LD). There is growing evidence that academic problems in school foreshadow later educational and employment difficulties and may affect multiple domains of functioning.<sup>6</sup>

In Canada, educational policies fall under provincial jurisdiction, therefore, definitions of LD vary widely and include learning problems, difficulties, disorders as well as 'children at risk'.<sup>7</sup> LD are assumed to be neurological in origin and affect the acquisition, organisation, retention, understanding or use of verbal and/or nonverbal information.<sup>8</sup> According to Statistics Canada, 4.9% of children aged 6–15 have an LD, varying from 1.6% for children aged 6–7.2% among 10-year-olds.<sup>9</sup>

While the consequences of LD on childhood academic and social development are well documented,<sup>10–11</sup> the impact in adulthood is challenging to assess. However, research suggests that LD often persist into adulthood and affect diverse aspects of functioning including employment, social relationships, quality of life and mental and physical health.<sup>12</sup>

In school settings, LD typically manifest as poor academic achievement, which is associated with a greater number of school absences, suspensions and grade retention as well as externalising and internalising behaviour problems.<sup>7–10</sup> Almost one-third of US adolescents with LD in the National Longitudinal Transition Study did not complete high school and were less likely to enrol in subsequent vocational or academic programmes compared to their non-LD peers.<sup>10</sup>

Research examining substance abuse among youth with LD remains inconclusive.<sup>13</sup> Beitchman *et al*<sup>11</sup> assessed 264 Canadian children for LD at ages 12 and 19, and for psychiatric and substance use disorders at age 19. Children who met criteria for LD at ages 12 and 19 were more likely to develop a psychiatric or substance use disorder compared with non-LD children at both time points. LD at 19 years of age increased the risk for substance use disorder threefold after controlling for behavioural problems and family structure. Difficulties with executive functioning, academic failure, low self-esteem and poor social skills are viewed as the strongest predictors of substance use disorder.<sup>14</sup>

Compared to non-LD peers, youth with LD frequently report feelings of loneliness, stress, depression and suicide, among other psychiatric symptoms.<sup>15–16</sup> For example, in the National Longitudinal Study of Adolescent Health, the LD sample was twice as likely to report a suicide attempt in the past year.<sup>16</sup> Longitudinal research on risk-taking indicates that, compared to non-LD peers, adolescents with LD engage more frequently in various risk behaviours.<sup>17</sup> Therefore, the presence of LD in childhood appears to confer a general risk for adverse outcomes throughout adolescence and into adulthood.

In identifying early indicators for homelessness, we are posing a larger question about how we might prevent homelessness and the myriad of associated negative health and social outcomes. There has been a resurgence of interest in early intervention as a means of preventing or attenuating a wide range of developmental outcomes in adulthood.<sup>18</sup> In this study, we focus on the relationship between early LD as a predictor of adult homelessness and associated health and service use outcomes. Unlike family instability and dysfunction, which fall under the jurisdiction of child welfare agencies, LD can be identified and addressed within the school system and may serve as an early marker of social and developmental risk.

## METHODS

The Vancouver At Home Project is a randomised controlled trial (RCT) involving homeless adults with mental illness in Vancouver, British Columbia. Study design and sample size were determined by the At Home/Chez Soi National Research Team which monitored activities at five different study sites.<sup>19</sup> Details related to the RCT protocol such as CONSORT have been reported elsewhere.<sup>19</sup> The current study focuses on baseline data from one study site (Vancouver) prior to randomisation and does not incorporate any findings related to RCT elements.

Eligibility criteria included legal adult status (19 years and older), current mental disorder on the MINI Neuropsychiatric Interview (MINI),<sup>20</sup> and being absolutely homeless or precariously housed. Absolute homelessness was defined as living on the streets or in an emergency shelter for at least the past seven nights with little likelihood of obtaining secure accommodation in the upcoming month. Precariously housed was defined as living in a rooming house, hotel or other transitional housing; in addition, individuals must have experienced at least two episodes of absolute homelessness in the past year, or one episode lasting for at least 4 weeks in the past year.

Participants were recruited through referral from over 40 agencies available to homeless adults in Vancouver; the majority of them were recruited from homeless shelters, drop-in centres, homeless outreach teams, hospitals, community mental health teams and criminal justice

programmes. We specifically targeted organisations that serve women, youth, aboriginal peoples and gay/lesbian/transgender individuals in order to obtain as diverse and representative a sample as possible. Referral was initiated by service providers and a preliminary screening for eligibility was conducted via telephone with the referral agent. All participants met face-to-face with a trained research interviewer who explained procedures, obtained informed consent and confirmed study eligibility. A cash honorarium of \$5 was provided for the screening process. Institutional ethics board approval was obtained through Simon Fraser University and the University of British Columbia.

Approximately 85 individuals were turned away on the phone because they clearly did not meet eligibility criteria. In addition, approximately 100 individuals were invited to meet with an interviewer for further eligibility screening and/or to begin the baseline questionnaire but did not show up for an appointment. Whenever possible, appointments were rescheduled and interviewers tried to locate individuals in the community. Finally, 92 recruits completed the formal eligibility screening process but were deemed ineligible. When these individuals were compared with participants who were enrolled in the study, no significant differences were found in terms of current age or gender.

If the individual met all study criteria, they were enrolled as a participant and the baseline interview started, consisting of a series of interviewer-administered questionnaires, including socio-demographic characteristics, psychiatric symptoms, substance use, physical health, service use and quality of life. Participants received a further cash honorarium of \$30 upon completion of the baseline interview. The following analyses are based on data from the baseline questionnaires of 497 participants recruited from October 2009 to June 2011.

### Variables of interest

LD were assessed using the following questions, focusing on childhood: (1) 'Do you think you had a learning problem or LD?' and (2) 'Did anyone ever tell you that you have a learning problem or LD?' Given the retrospective nature of these questions, only participants who responded positively to both questions were included in the analysis.

With regard to mental disorders, Severe Cluster includes at least one of current Psychosis, Mood Disorder with Psychotic Features and Hypomanic or Manic Episode, as identified through the MINI or documented physician diagnosis. Less Severe Cluster includes at least one of current Major Depressive Episode, Panic Disorder and Post-traumatic Stress Disorder. Suicidality, Alcohol Dependence and Substance Dependence were also identified using the MINI. Frequency and type of substance use over the past month were recorded using the Maudsley Addiction Profile (MAP).<sup>21</sup> Physical illness was assessed by self-report using a checklist of 30 chronic health conditions (lasting longer than 6 months). Blood-borne infectious disease consisted of positive self-

report diagnosis of HIV, hepatitis B or hepatitis C. Head injury status was based on the question 'Did you ever receive a head injury that left you unconscious?' Shoplifting and selling drugs were assessed during the past month using the MAP.

Self-reported involvement with health services was collected for the past 6 months including visiting and talking to a health or service provider, emergency room (ER) visits and being transported by ambulance. Criminal justice services included contact with the police that resulted in detention, arrest and court appearances. The Multnomah Community Ability Scale (MCAS)<sup>22</sup> quantifies community functioning based on 17 items and was scored by the interviewer upon completion of the baseline interview.

### Statistical analyses

Comparisons of categorical data between participants who did or did not report a learning problem or disability were conducted using Pearson's  $\chi^2$  or Fisher's exact test. Comparisons of numeric variables (eg, age at enrolment) between groups were conducted using the Student's *t* test and Wilcoxon's rank-sum test. Univariate and multivariable logistic regression analyses were used to model the independent associations between childhood LD and a series of a priori outcome variables. Outcome variables that were significant at the  $p \leq 0.10$  level were considered for univariate and multivariable logistic regression analyses. Each variable was modelled in both univariate and multivariate settings using childhood LD as an independent risk factor and the same set of controlling variables (age at enrolment, age of first homelessness, gender, ethnicity, marital status and language spoken in the childhood home). Both unadjusted OR (UOR) and adjusted OR (AOR) and 95% CI are reported and all *p* values are two sided. SPSS-19 was used to conduct these analyses. Missing values ranged from 0% to 4% and were excluded from the analyses.

### RESULTS

In total, 497 participants completed the baseline questionnaire; 178 participants (36%) thought they had a learning problem or disability in childhood, 182 (37%) reported being told they had a learning problem or disability and 133 (27%) responded positively to both indicators of childhood LD. The majority of the total sample was male (73%) and Caucasian (56%); the mean age at enrolment was 40.8 (SD=11.0) years; and the mean age when first homeless was 30.3 (SD=13.3) years. The median duration of lifetime homelessness was 36 months (IQR 12–84 months). All bivariate comparisons by childhood LD are summarised in tables 1–3. Tables 1 and 2 present demographic characteristics and current mental disorder status of participants by childhood LD status (yes vs no).

Table 3 presents self-reported substance use (past month) and service use (past 6 months) characteristics

**Table 1** Comparisons of sociodemographic characteristics between participants who reported childhood learning problems or disabilities (LD-Yes; n=133) and those who did not (LD-No; n=364)†

Variable	Total sample N (%)	LD-No N (%)	LD-Yes N (%)	p Value
Male gender	359 (73)	259 (72)	100 (76)	0.375
Age at enrolment				0.001*
19–25 years	36 (7)	25 (7)	11 (8)	
25–44 years	281 (57)	190 (52)	91 (68)	
Over 44 years	180 (36)	149 (41)	31 (23)	
Ethnicity				0.469
Aboriginal	77 (15)	52 (14)	25 (19)	
Caucasian	280 (56)	208 (57)	72 (54)	
Other	140 (28)	104 (29)	36 (27)	
Educational attainment (≤grade 8)	76 (15)	44 (12)	32 (25)	<0.001*
Single marital status	343 (70)	250 (69)	93 (70)	0.797
Language spoken at home during childhood (English)	392 (79)	282 (77)	110 (83)	0.206
Psychiatric hospitalisation (past 5 years) longer than 6 months	57 (12)	43 (12)	14 (11)	0.686
Psychiatric hospitalisation (past 5 years) 2 or more times	253 (53)	189 (54)	64 (50)	0.542
Employment history (at least 1 year of continuous work)	323 (65)	243 (67)	80 (60)	0.138
Jail (past 6 months)	68 (14)	46 (13)	22 (17)	0.262
Duration of homelessness				
Total lifetime (>3 years)	234 (48)	155 (43)	79 (61)	<0.001*
Longest single period (>1 year)	245 (50)	174 (48)	71 (55)	0.143
Age of first homelessness (<25 years)	214 (44)	143 (39)	71 (56)	0.001*
Overall health (poor or fair)	235 (47)	161 (44)	74 (56)	0.026**
MCAS total score (<56)‡	244 (49)	177 (49)	67 (50)	0.730

\*p<0.001

\*\*p<0.05.

†Each multivariable model was controlled for age (continuous measure), age of first homelessness (continuous measure), gender, ethnicity (Aboriginals, Caucasian, other), marital status (Single vs other) and language spoken in childhood home (English vs other).

‡Dichotomised based on median value.

MCAS, Multnomah Community Ability Scale.

**Table 2** Comparisons of mental disorders and physical illness between participants who reported childhood learning problems or disability (LD-Yes; n=133) and those who did not (LD-No; n=364).†

Variable	Total sample N (%)	LD-No N (%)	LD-Yes N (%)	p Value
Mental disorders (past month)				
Major depressive episode	199 (40)	134 (37)	65 (49)	0.015*
Manic or hypomanic episode	97 (20)	64 (18)	33 (25)	0.072**
Post-traumatic stress disorder	129 (26)	88 (24)	41 (31)	0.122
Panic disorder	104 (21)	64 (18)	40 (30)	0.002*
Mood disorder with psychotic features	84 (17)	57 (16)	27 (20)	0.208
Psychotic disorder	263 (53)	200 (55)	63 (47)	0.134
Alcohol dependence	121 (24)	79 (22)	42 (32)	0.023*
Substance dependence	288 (58)	205 (56)	83 (62)	0.224
Two or more mental disorders	240 (48)	158 (43)	82 (62)	<0.001***
High suicidality	87 (18)	54 (15)	33 (25)	0.010**
Less severe cluster	264 (53)	176 (48)	88 (66)	<0.001***
Severe cluster	363 (73)	267 (73)	96 (72)	0.794
Physical health				
Migraine	157 (32)	94 (26)	63 (48)	<0.001***
Epilepsy or seizures	67 (14)	40 (11)	27 (21)	0.006*
Blood-borne infectious diseases	157 (32)	103 (29)	54 (41)	0.008*
Head injury	270 (56)	179 (51)	91 (71)	<0.001***
Two or more physical conditions	402 (81)	287 (78.8)	115 (86)	0.056**

\*p<0.05

\*\*p<0.10

\*\*\*p<0.001

†Each multivariable model was controlled for age (continuous), age of first homelessness (continuous), gender, ethnicity (Aboriginals, Caucasian, other), marital status (Single vs other) and language spoken in childhood home (English vs other).

**Table 3** Comparisons of substance use and service utilisation between participants who reported childhood learning problems or disability (LD-Yes; n=133) and those who did not (LD-No; n=364)†

Variable	Total sample N (%)	LD-No N (%)	LD-Yes N (%)	p Value
Substance use (past month)				
IV drug use	88 (18)	53 (15)	35 (27)	0.003*
Daily substance use (including alcohol)	143 (29)	91 (25)	52 (39)	0.002*
Daily drug use (no alcohol)	126 (25)	78 (21)	48 (36)	0.001***
Daily hard drug use (no alcohol, no marijuana)	74 (15)	45 (12)	29 (22)	0.009*
Daily alcohol use	26 (5)	17 (5)	9 (7)	0.367
Polysubstance use (no alcohol)	188 (38)	128 (35)	60 (45)	0.050*
Age first drunk (<14 years)	212 (45)	142 (42)	70 (56)	0.007*
Age of first drug use (<14 years)	178 (40)	114 (35)	64 (52)	0.001***
Sold drugs	50 (10)	32 (9)	18 (14)	0.140
Shop-lifting	62 (13)	34 (10)	28 (21)	0.001***
Service use (past 6 months)				
Psychiatrist	134 (27)	109 (30)	25 (19)	0.013*
Addiction counselor	18 (4)	10 (3)	8 (6)	0.084**
Seen by a health/social service provider	384 (78)	276 (76)	108 (82)	0.204
Talked with a health/social service provider	112 (23)	69 (19)	43 (32)	0.002*
ER visit (yes/no)	281 (58)	204 (57)	77 (60)	0.594
Multiple ER visits (three or more)	107 (22)	71 (20)	36 (28)	0.058**
Ambulance (yes/no)	195 (40)	147 (41)	48 (36)	0.381
Police detention (yes/no)	80 (19)	61 (19)	19 (17)	0.610
Arrested (yes/no)	172 (36)	124 (35)	48 (38)	0.603
Multiple arrests (two or more)	75 (16)	48 (14)	27 (21)	0.044*
Court appearance	172 (35)	127 (36)	45 (35)	0.932
Justice program	48 (11)	30 (9)	18 (16)	0.076**

\*p≤0.05

\*\* p≤0.10

\*\*\*p≤0.001.

†Each multivariable model was controlled for age (continuous), age of first homelessness (continuous), gender, ethnicity (Aboriginals, Caucasian, other), marital status (Single vs other) and language spoken in childhood home (English vs other). ER, emergency room.

by childhood LD status. Participants who reported having a childhood LD were significantly more likely to report a number of negative health outcomes related to physical health (ie, blood-borne infectious diseases, migraine and seizures), mental health (ie, major depressive episode, panic disorder and high suicidality) and substance use (ie, alcohol dependence, early initiation of drug use, daily drug use and injection drug use).

UOR and AOR and 95% CI for variables included in the univariate and multivariable analyses are presented in table 4. Results from the multivariable logistic regression analyses indicate that reporting a childhood LD independently predicted not entering high school (AOR 2.21), lifetime duration of homelessness greater than 3 years (AOR 1.90), current major depressive episode (AOR 1.64), panic disorder (AOR 1.86), alcohol dependence (AOR 1.69), high suicidality (AOR 1.93), less severe cluster of mental disorders (AOR 1.95), two or more mental disorders (AOR 2.06), infectious disease (AOR 1.75), migraine (AOR 2.50), seizures (AOR 2.23), head injury (AOR 2.23), poor or fair overall health (AOR 1.90), injection drug use (AOR 2.01), daily drug and alcohol use (AOR 1.70), daily drug use (not including alcohol) (AOR 1.77), daily hard drug use (not

including alcohol or marijuana) (AOR 1.79), early initiation of drug use (<14 years) (AOR 1.60), shoplifting in the past 6 months (AOR 2.31) and talking to a health or social service provider in the past 6 months (AOR 2.00).

## DISCUSSION

Our multivariable models identified several factors that were associated with self-reported childhood LD in a cohort of adults who are homeless and have a mental disorder: longer lifetime duration of homelessness; less severe mental disorders as well as multiple mental disorders and high suicidal ideation; early and severe substance use, including injection drug use and daily use of both drugs and alcohol; and physical health problems, including infectious disease, head injury, multiple illnesses and rating ones' overall health as fair or poor. Despite the complex health needs of this sub-group, the only service use variable that was predicted by childhood learning problems or disabilities was very generic: talking to a health or social service provider in the past 6 months. A range of criminal justice variables as well as ER, ambulance utilisation and various other health services were not significant in our analyses.

**Table 4** Logistic regression analyses for socio-demographics, mental disorders, substance use-related and service utilisation-related outcomes based on early-learning problems or disability (n=497)

Outcome variable	Unadjusted OR (95% CI)	Adjusted OR (95% CI)†
Age of first homelessness (<25 years)‡	1.96 (1.30 to 2.95)*	1.52 (0.95 to 2.44)
Lifetime duration of homelessness (>3 years)§	2.11 (1.40 to 3.18)*	1.90 (1.19 to 3.06)**
Education level (grade 8 or less)	2.38 (1.43 to 3.95)	2.20 (1.28 to 3.81)
Type of mental disorder		
Major depressive episode	1.64 (1.10 to 2.45)**	1.64 (1.07 to 2.52)**
Manic or hypomanic episode	1.55 (0.96 to 2.49)	1.51 (0.91 to 2.51)
Panic disorder	2.02 (1.28 to 3.19)**	1.86 (1.15 to 3.02)**
Alcohol dependence	1.67 (1.07 to 2.59)**	1.69 (1.06 to 2.69)**
Two or more mental disorders	2.10 (1.40 to 3.15)*	2.06 (1.33 to 3.19)*
High suicidality	1.89 (1.16 to 3.09)**	1.93 (1.15 to 3.24)**
Less severe cluster of mental disorders	2.10 (1.38 to 3.16)*	1.95 (1.25 to 3.04)**
Physical health		
Blood-borne infectious diseases	1.76 (1.16 to 2.66)**	1.75 (1.11 to 2.74)**
Migraine	2.57 (1.70 to 3.90)*	2.50 (1.62 to 3.88)*
Seizures	2.11 (1.23 to 3.61)**	2.23 (1.25 to 4.00)**
Multiple physical illness	1.71 (0.98 to 2.99)	2.16 (1.16 to 4.02)**
Overall health (fair/poor)	1.57 (1.06 to 2.35)**	1.90 (1.24 to 2.92)**
History of head injury	2.33 (1.51 to 3.59)**	2.23 (1.42 to 3.50)**
Substance use		
IV drug use	2.07 (1.28 to 3.36)**	2.01 (1.19 to 3.39)**
Daily drug use (no alcohol)	2.07 (1.34 to 3.19)*	1.77 (1.12 to 2.80)**
Daily drug use (no alcohol, no marijuana)	1.98 (1.18 to 3.31)**	1.79 (1.03 to 3.11)**
Daily substance use (including alcohol)	1.93 (1.26 to 2.94)**	1.70 (1.09 to 2.65)**
Poly-substance use (no alcohol)	1.50 (1.00 to 2.24)	1.27 (0.82 to 1.97)
Age first drunk (<14 years)	1.75 (1.16 to 2.65)**	1.37 (0.88 to 2.14)
Age of first drug use (<14 years)	1.98 (1.30 to 3.02)*	1.60 (1.02 to 2.50)**
	2.53 (1.46 to 4.36)*	2.31 (1.30 to 4.11)**
Service use		
Talked with a health/social service provider	1.99 (1.30 to 3.11)**	2.00 (1.25 to 3.21)**
Multiple ER visits (three or more)§	1.12 (0.74 to 1.68)	1.04 (0.67 to 1.60)
Multiple arrests (two or more)§	1.70 (1.01 to 2.87)**	1.65 (0.95 to 2.86)
Justice program	1.76 (0.94 to 3.92)	1.34 (0.59 to 3.08)

\*p&lt;0.001.

\*\*p&lt;0.05.

†Each multivariable model was controlled for (continuous), age of first homelessness (continuous), gender, ethnicity (Aboriginal, Caucasian, other), marital status (Single, other) and language spoken in the childhood home (English, other).

‡This multivariable model was controlled for age (continuous), gender, ethnicity (Aboriginal, Caucasian, other), marital status (Single, other) and language spoken in the childhood home (English, other).

§Dichotomised based on median value.

ER, emergency room.

Collectively, our results indicate that childhood LD are overrepresented among homeless adults with complex comorbidities and predict a range of poor health outcomes in adulthood.

These findings support previous research demonstrating a link between poor academic achievement and the psychological adversity faced by some adults.<sup>6–23</sup> Studies of homeless and highly mobile children have identified that both groups show slower learning and academic progress than their residentially stable peers.<sup>23</sup> However, the risk of homelessness among people with LD has received scant attention in the research literature.<sup>24–25</sup> Among our sample of homeless adults, 41% did not graduate from high school and 43% reported being in a special class in school, suggesting that learning and academic achievement was challenging throughout their

school years and likely persists in adulthood in the form of poor literacy skills and difficulties finding and maintaining employment.

Our index of LD does not discriminate between focal and more general cognitive difficulties, nor did we assess the presence of LD in adulthood. Several studies have found increased rates of general cognitive impairment among homeless adults compared to housed comparison groups.<sup>26–27</sup> In our sample of homeless adults with current mental disorders, 66% reported experiencing a head injury that left them unconscious. However, these injuries may have occurred in adulthood and it is well documented that homeless adults are more likely to experience a variety of accidents compared to housed counterparts.<sup>27</sup> It is also possible that childhood LD among our sample were related to psychological distress

in the home.<sup>24</sup> Regardless of the origin of learning problems among homeless adults, it appears that they persist over time and are associated with significant functional impairment.

Childhood LD independently predicted a range of substance use problems in our adult sample, including early initiation of drug use (before age 14). Abuse of alcohol and other drugs places an individual at greater risk of homelessness, but is not a direct causal factor.<sup>28</sup> Along with other studies, our findings suggest that daily drug use is a common mediator for a range of early risk factors.<sup>29</sup> Previous research using our sample of homeless adults with mental disorders found that daily drug use significantly predicts the duration of homelessness<sup>30</sup> as well as the severity of mental health symptoms.<sup>31</sup>

Cross-sectional, retrospective data cannot disentangle the unique predictors of homelessness and mental illness, but it is likely that negative childhood experiences have both direct and indirect (mediated by substance use) effects on participants' history of homelessness. Documentation of these underlying common factors points to a broad range of vulnerabilities for homelessness and mental illness. These common factors increase the complexity of personal problems as well as the duration of homelessness.<sup>30</sup> Therefore, substance dependence, especially when concurrent with mental illness among homeless populations, is not only a clinical problem but also a critical indicator for a range of other social and psychological problems that may need to be addressed before homelessness can be resolved.

Problems such as homelessness that have long developmental trajectories, are perhaps best understood from models of cumulative adversity and amplification of risk.<sup>32 33</sup> Based on life course development and social learning theory, the risk amplification model addresses mechanisms through which experiences on the street amplify negative developmental effects originating in the family. According to this model, harmful behaviours and negative self-concept are perpetuated by the progressive accumulation of their own consequences. Thus, homelessness can be understood as a result of a developmental trajectory defined by successive environmental disruptions, each of which places individuals at greater risk for homelessness and associated risk factors. Individuals generally become homeless after experiencing a crisis due to limited income, social support and personal coping skills.<sup>5 28</sup> However, it is unclear as to what leads some people to become homeless while others do not. The risk amplification model may apply primarily to subgroups who are most vulnerable to a variety of structural contributors to homelessness such as poverty and the lack of affordable housing. Problem Behaviour Theory<sup>34 35</sup> suggests that various risk factors may comprise a cluster of risky behaviours that mediate the link from childhood adversity to illicit drug use in adulthood, rather than distinct independent pathways. Another potential pathway linking childhood adversity to adult homelessness is the likelihood that such

adversity elevates individuals' risk for psychiatric disorders such as depression and substance abuse, which are risk factors for homelessness, by reducing one's ability to earn adequate income and maintain stable housing.

### Implications

The growing body of research that suggests a trajectory of risk preceding the first episode of homelessness begs the question 'Can outcomes such as homelessness be prevented?' In addition to addressing structural barriers such as income inequality and affordable housing, many researchers and policy makers have called for comprehensive preventive interventions for high-risk children in public and community settings.<sup>36 37</sup> Supporting children's cognitive development and schooling is particularly important and early childhood education programmes should be available for children at greatest risk. High risk includes established indicators such as early learning problems, abuse and/or neglect, behavioural and emotional problems and early substance use. From a public health perspective, early interventions in childhood might change or moderate the cycle of homelessness across generations because early risk factors are often longstanding and drive a trajectory of cumulative risk, potentially leading to severe psychopathology and social exclusion. Despite the need for early intervention, our study also highlights the need for identifying and addressing current learning problems among homeless adults. Learning problems may contribute to challenges with print and financial literacy, obtaining and maintaining housing and employment and a wide range of daily living skills.

### Limitations

Despite the strengths of our study design (ie, large sample size, diverse recruitment strategy and structured diagnostic interviews), several limitations must be considered. First, all variables were based on participant self-report. Given that participants were selected based on current mental disorder, accuracy of recall may have been compromised. Furthermore, participants were interviewed before being randomised to a housing intervention, and therefore, some may have modified their responses in an attempt to influence the outcome of randomisation. In addition, at baseline, we did not have access to early trauma or family dysfunction variables. Given the association between early trauma, foster care placements and adult homelessness,<sup>2</sup> it will be important to further examine the impact of these variables on later health and social outcomes. Similarly, we did not have access to measures of current LD or general cognitive impairment at baseline. Examination of current cognitive impairment, particularly as it relates to early-learning problems, may shed light on current health and social functioning.

### Future directions

Early indicators of risk clearly cannot explain all cases of homelessness. Many people without early risk factors become homeless and many who experience risk do not

become homeless. Further research is needed to examine what differentially places people at risk for risk.<sup>38</sup> We need better theory and better data to understand how social factors regulate behaviours or distribute individuals into risk groups and how those social factors 'push' individual trajectories towards or away from adverse outcomes. However, our results linking early-learning problems to homelessness, mental illness and substance use are consistent with a growing body of research indicating that adverse childhood events are potent risk factors for a number of psychiatric and substance use disorders.<sup>6</sup>

Real prevention with regard to homelessness and other social problems will require systemic social and policy changes that address the environments within which children adapt so that they can mature into well-functioning adults. Nonetheless, our findings, along with others', outline a risk profile that can guide future research into mechanisms and pathways through which childhood risks are translated into adult sequelae. Interventions that can effectively address childhood risk factors such as learning problems and disabilities may ultimately prevent critical social problems including homelessness and the enormous social and individual costs related to these problems.

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