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## Chapter 2.4

### The Health of Street Youth in Canada: A Review of the Literature

JEAN-FRANÇOIS BOIVIN, ÉLISE ROY, NANCY HALEY,  
AND GUILLAUME GALBAUD DU FORT

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Street youth are exposed to a number of factors that may detrimentally affect their health, including unsafe sexual practices, drug use, poor diet, inadequate shelter, exposure to violence, low levels of social support, and limited access to medical care (Noell et al., 2001a; Rohde et al., 2001). In recent literature, the term *street youth* has been used to describe youth living or working on the streets of major urban centres, and it is usually associated with varying degrees of homelessness. In 1998, the Canadian Paediatric Society indicated that estimates of the number of runaways in Canada ranged from 45,000 to 150,000 (Canadian Paediatric Society, 1998), for a population of approximately four million subjects in the age group of 10 to 19 years. There are, however, considerable difficulties in arriving at such estimates (Ringwalt et al., 1998), and these figures represent only expert opinion.

Epidemiologic studies of the health status of street youth are relatively recent. In 1989, the Council on Scientific Affairs of the American Medical Association published a report on the health care needs of

homeless and runaway youth (Council on Scientific Affairs, 1989); only one peer-reviewed epidemiologic study was cited by the Council at that time (McCormack et al., 1986). Since then, numerous studies have been conducted. The objective of the current paper is to review the existing scientific knowledge on the health status of street youth, with a specific focus on Canadian data.

## Methods

We identified the epidemiologic studies for our review from searches of the MEDLINE database and the bibliographies of published papers. The keywords used in MEDLINE searches were: “homeless youth,” “street youth,” and “runaways.” We excluded studies of homeless youth when these focused on young people living with their homeless family. We did not include technical reports and other documents not subjected to peer review by scientific journals.

The main health outcomes assessed were blood-borne and sexually transmitted infections, mental health problems, pregnancy, violence and mortality.

We concentrated on research that included teenagers. We allowed, however, broader age definitions, from the pre-teens to 30 years, as long as adolescents were also included.

We focused on studies on Canada and other countries with somewhat similar cultural and social contexts, namely the United States, the United Kingdom and Australia. We restricted our search to the peer-reviewed literature published between 1980 and 2003.

Throughout our review, we paid particular attention to the comparison of street youth data to reference data for non-street youth. In the case of infectious diseases, for which the reviewed papers generally did not include any non-street comparison group, we sought reference figures from the published literature. For the other health outcomes, we relied on data (if any) provided by the authors of the reviewed papers.

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**TABLE I**  
**Prevalence and Incidence of Infectious Disease Markers Among Canadian Street Youth and Comparison Populations**

Subjects	Place	Year(s)	Testing Method(s)	Ages (years)	Rate	Sample Size
<b>Hepatitis A (prevalence)</b>						
Street youth <sup>7</sup>	Montreal	1995-96	Serum	14-25	4.7%	427
Street youth <sup>8</sup>	Vancouver	1998	Saliva	<25	6.3%	111
Comparison: Canadian-born university students <sup>6</sup>	Toronto	1997	Serum	18-19	1.5%	66
				20-24	6.2%	370
<b>Hepatitis B (prevalence)</b>						
Street youth <sup>9</sup>	Montreal	1995-96	HBsAg or anti-HBc	14-18	3.4%	176
Street youth <sup>10</sup>	Toronto	1991*	Anti-HBs	19-25	13.2%	258
Comparison: general population <sup>22</sup>	Northern Ontario	1993	Anti-HBs (not attributable to vaccination)	≤20	9.2%	87
				14-30	0.78%	641
<b>Hepatitis C (prevalence)</b>						
Street youth <sup>12</sup>	Montreal	1995-96	Antibody tests	14-18	6.2%	176
Comparison: general population <sup>23</sup>	Canada	1998	Statistical modeling	19-25	16.9%	261
				All ages	0.8%	30 million
				15-19	0.1%	2 million
				20-39	1.51%	9.6 million
<b>HIV infection (prevalence)</b>						
Street youth <sup>10</sup>	Toronto	1991*	Serum	≤20	1.1%	87
Street youth <sup>13</sup>	Montreal	1995	Saliva	13-20	0.5%	609
Street youth <sup>15</sup>	Toronto	1991-92	Serum and saliva	21-25	4.7%	300
Comparison: young offenders <sup>24</sup>	British Columbia	1994	Saliva	14-19	0.8%	450
				20-25	5.8%	245
Comparison: sentinel adolescent clinics <sup>14</sup>	12 US cities (22 clinics)	1990-92	Serum	12-15	0.29%	354
				16-19	0.22%	452
				<20	0.2%	11,833
No comparison data for general population subjects 20-24 or 20-29 years old (or similar age groups) were found						
<b>Chlamydia trachomatis genital infection (prevalence)</b>						
Street youth <sup>14</sup>	Montreal	1999-2000	Polymerase chain reaction; urine	14-20	9.0%	155
Comparison: general population <sup>25</sup>	US	2001-02	Ligase chain reaction; urine	21-25	4.1%	147
				18-19	4.05%	1,453
				20-21	4.70%	4,123
				22-23	4.10%	5,520
				24-25	3.56%	3,101
<b>Neisseria gonorrhoeae infection (prevalence)</b>						
Street youth <sup>14</sup>	Montreal	1999-2000	Polymerase chain reaction	14-25	0%	302
Comparison: general population <sup>25</sup>	US	2001-02	Ligase chain reaction	18-26	0.43%	14,322
<b>HIV infection (incidence)</b>						
Street youth <sup>21</sup>	Montreal	1995-2000	Saliva	14-25	6.9 / 1,000 py†	863
				14-18	10.3 / 1,000 py	371
				19-25	6.0 / 1,000 py	492
Comparison: army personnel <sup>27</sup>	US	1985-99	Serum	All ages	0.17 / 1,000 py	2,004,903
				<20	0.19 / 1,000 py	n.a.‡
				20-24	0.20 / 1,000 py	n.a.‡

\* Year of publication of report (where no information about the time period of study was available).  
† py: person-years.  
‡ n.a.: not available.  
The results of a study conducted by Rouget et al.<sup>20</sup> in Edmonton are not shown in this table because of the smaller sample size and the particular source of the study subjects (n=36 female street youth admitted to a Youth Centre).

**Table 1: Prevalence and Incidence of Infectious Disease Markers Among Canadian Street Youth and Comparison Populations**

### Infectious diseases

We identified 16 reports providing prevalence (Alderman et al., 1998; DeMatteo et al., 1999; Haley et al., 2002; Noell et al., 2001a; Ochnio et al., 2001; Pfeifer & Oliver, 1997; Rouget et al., 1994; Roy et al., 1999, 2000, 2001, 2002a; Sherman, 1992; Stricof et al., 1991; Sweeney et al., 1995; Wang et al., 1991) or incidence (Noell et al., 2001a; Roy et al., 2003) esti-

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mates for markers of past or present infectious diseases in street youth, all based on laboratory tests.

Table 1 presents results from Canadian studies. We also present comparison figures, based on data cited by the authors of the reviewed papers or from papers identified through other sources such as the Health Canada Population and Public Health Branch website (Glasgow et al., 1997; Levy et al., 2001; Miller et al., 2004; Renzullo et al., 2001; Rothon et al., 1997; Sweeney et al., 1995; Zou et al., 2000). Some of these comparison figures are drawn from American studies, because appropriate Canadian figures could not always be identified. Results are presented by age subgroups where available.

These data indicate that prevalence of hepatitis B and hepatitis C are significantly higher among street youth than among non-street persons of similar age; there is also an indication of an increased prevalence of *Chlamydia trachomatis* genital infection among younger subjects. On the other hand, the prevalence of hepatitis A is not increased. Table 1 also gives estimates of the prevalence and of the incidence of HIV infection. These data suggest that HIV infection is also higher among street youth. It was particularly difficult, however, to identify comparison figures for HIV infection. For prevalence, Table 1 gives two comparison figures, one for British Columbia young offenders, and one for U.S. sentinel adolescent clinics; in both cases, however, these comparison estimates were restricted to youth below 20 years of age. Fragmentary evidence based on AIDS cases reported to the Centre for Infectious Disease Prevention and Control (Health Canada, 2004) suggests that the HIV infection prevalence observed in older street youth (20 to 24 years old) is also in excess of expectation, but no data confirming this impression were found. For the incidence of HIV infection, we compared street youth data to incidence estimates for U.S. army personnel (Renzullo et al., 2001), and rates were higher for street youth in each age category.

These results must be interpreted with caution, since the studies of street youth and those of non-street youth used different recruitment and diagnostic methods, and since different geographic locations are being compared.

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**Table 2: Risk Factors Associated with Infectious Disease Markers in Montreal Street Youth**

<b>TABLE II</b>	
<b>Risk Factors Associated with Infectious Disease Markers in Montreal Street Youth</b>	
<b>Risk Factor (adjustment variables)</b>	<b>Odds Ratio (95% confidence limits)</b>
<b>Hepatitis A (prevalence), n=427<sup>7</sup></b>	
Birth in a country with high seroprevalence of hepatitis A virus antibodies	200.7 (38.1-1058.4)
Sexual partner(s) with history of unspecified hepatitis	13.8 (4.2-45.2)
Insertive anal penetration (Adjusted for each other)	5.1 (1.6-16.7)
<b>Hepatitis B (prevalence), n=437<sup>9</sup></b>	
Age (19-25 versus 14-18 years old)	4.5 (1.8-11.7)
Drug injection	3.5 (1.5-8.3)
Sexual partner with unspecified hepatitis (Adjusted for each other and for tattooing and body piercing)	3.2 (1.3-7.5)
<b>Hepatitis C (prevalence), n=437<sup>12</sup></b>	
Drug injection	28.4 (6.6-121.4)
Age (19-25 versus 14-18 years old)	3.3 (1.6-7.0)
Crack cocaine use (Adjusted for each other and for tattooing)	2.3 (1.0-5.3)
<b>HIV infection (prevalence), n=909<sup>13</sup></b>	
Age (21-25 versus 13-20 years old)	7.09 (1.98-25.36)
Drug injection	4.48 (1.33-15.11)
Birth outside Canada	4.41 (1.05-18.48)
Prostitution (Adjusted for each other)	3.32 (1.15-9.62)
<b>HIV infection (incidence), n=863<sup>21</sup></b>	
Drug injection (Unadjusted; adjustment for involvement in survival sex did not appreciably modify the estimate)	7.0 (2.2-21.7)

Multivariable analyses of risk factors for infections have been reported for street youth from Vancouver (hepatitis A), Toronto (hepatitis B), and Montreal (hepatitis A, B, and C, and HIV infection). The Vancouver study included street youth, injection drug users, and men who have sex with men (Ochnio et al., 2001), and the prevalence of hepatitis A was higher in subjects born in countries with high rates of hepatitis A. The Toronto study included street youth as well as adolescents who lived with their family (Wang et al., 1991); the number of lifetime sexual partners and the practice of anal intercourse were associated with the presence of hepatitis B markers.

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**Table 3: Prevalence of Mental Health Disorders in Street Youth Compared to Non-street Youth**

TABLE III Prevalence of Mental Health Disorders in Street Youth Compared to Non-street Youth						
Parameters	Fort Lauderdale <sup>99</sup>		Oregon <sup>1</sup>		Detroit <sup>28</sup>	
	Homeless	ECA <sup>  </sup>	Homeless	Students	Homeless	Housed <sup>†</sup>
Type of youth	1991†	1980-84	1994-97	1987-89	1993-94	1993-94
Year(s) of interviews	18-21	18-24	13-20	14-18	12-17	12-17
Age (years)	100	2,256	523	1,710	118	118
Sample size	One month	One month	Current	Current	Six months	Six months
Prevalence time-window	DIS‡	DIS	SCID	K-SADS-P	DISC-2.3	DISC-2.3
Study instrument*	<b>Disorders</b>					
Alcohol abuse and dependence	27.2% <sup>§</sup>	4.1%	n.e.**	n.e.	21.2%	9.3%
Drug abuse	27.2% <sup>§</sup>	n.e.	n.e.	n.e.	n.e.	n.e.
Drug abuse and dependence	n.e.	3.5%	n.e.	n.e.	23.7%	18.6%
Schizophrenia	6.1% <sup>§</sup>	0.7%	n.e.	n.e.	n.e.	n.e.
Mania/hypomania	n.e.	n.e.	n.e.	n.e.	24.6%	18.6%
Depression/dysthymia	n.e.	n.e.	17.6%	2.9%	33.0%	24.6%
Major depression	18.3% <sup>§</sup>	2.2%	12.2%	2.6%	n.e.	n.e.
Dysthymia	n.e.	n.e.	6.5%	0.5%	n.e.	n.e.
Disruptive behaviour	n.e.	n.e.	n.e.	n.e.	39.0%	19.5%

\* DIS: Diagnostic Interview Schedule.<sup>32</sup>  
 SCID: Structured Clinical Interview for DSM-IV Axis I Disorders-Nonpatient edition. Interviewers were trained and supervised during the study.<sup>1</sup>  
 K-SADS-P: Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present Episode.<sup>33</sup>  
 DISC-2.3: Diagnostic Interview Schedule for Children Version 2.3.<sup>34</sup>  
 † Date of publication of paper (used when date of recruitment of study subjects was not mentioned).  
 ‡ Two items for the diagnosis of schizophrenia were not included.  
 § The authors did not report observed percentages but rather race- and sex-adjusted figures.  
 || Epidemiologic Catchment Area program (a general population survey of psychiatric disorders conducted at five sites in the US).  
 ¶ Housed adolescents were matched to homeless adolescents for neighbourhood, age, and sex.  
 \*\* n.e.: no estimate included in the report.

In the Montreal study, analyses were restricted to street youth (Roy et al., 1999, 2000, 2001, 2002a, 2003). The prevalence of hepatitis B, hepatitis C, and HIV infection markers increased with age. Drug injection was associated with hepatitis B, hepatitis C, and HIV infection. Crack cocaine use was associated with hepatitis C, and prostitution with HIV infection. More detailed results are provided in Table 2.

### *Mental health and addiction*

We identified 25 surveys of mental health problems among street youth (Adlaf et al., 1996; Booth & Zhang, 1996; Cauce et al., 2000; Dadds et al., 1993; Feitel et al., 1992; Greenblatt & Robertson, 1993; Greene & Ringwalt, 1996; Hier et al., 1990; Kipke et al., 1997; McCarthy & Hagan, 1992; McCaskill et al., 1998; McCormack et al., 1986; Molnar et al., 1989; Mundy et al., 1990; Rohde et al., 2001; Rotheram-Borus, 1993; Shade et al., 1998; Smart & Adlaf, 1991; Smart et al., 1994; Smart & Walsh, 1993; Stiffman, 1989; Warheit & Biafora, 1991; Whitbeck et al., 2000; Unger et al., 1997; Yoder, 1999).

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Some investigators have used standardized survey instruments to assess prevalence of mental health problems, while others have modified existing instruments or developed their own. Some instruments, such as the Diagnostic Interview Schedule (Robins et al., 1981), the Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present Episode (Chambers et al., 1985), and the Diagnostic Interview Schedule for Children Version 2.3 (Shaffer et al., 1996) are compatible with diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM) of the American Psychiatric Association (1987), while other instruments were not designed with this purpose in mind.

Fifteen of the 25 reviewed studies included comparisons of data between street and non-street youth, the latter group either from within the same study or drawn from the literature (Cauce et al., 2000; Dadds et al., 1993; Greene & Ringwalt, 1996; Greenblatt & Robertson, 1993; Hier et al., 1990; Kipke et al., 1997a; McCaskill et al., 1998; Robertson et al., 1989; Rohde et al., 2001; Smart & Adlaf, 1991; Smart et al., 1994; Stiffman, 1989; Warheit & Biafora, 1991; Whitbeck et al., 2000; Yoder, 1999).

Fifteen studies assessed correlates of mental health problems in street youth using multivariable statistical models (Adlaf et al., 1996; Booth & Zhang, 1996; Cauce et al., 2000; Greene & Ringwalt, 1996; Hier et al., 1990; Kipke et al., 1997a; McCarthy & Hagan, 1992; Molnar et al., 1998; Mundy et al., 1990; Smart & Adlaf, 1991; Smart & Walsh, 1993; Stiffman, 1989; Unger et al., 1997; Whitbeck et al., 2000; Yoder, 1999).

Table 3 summarizes the results of the only three surveys of street youth providing DSM-compatible diagnoses and presenting comparisons of prevalence estimates between street and non-street youth (Lewinsohn et al., 1993; McCaskill et al., 1998; Regier et al., 1988; Rohde et al., 2001; Warheit & Biafora, 1991). These three American studies are presented here because no equivalent study was identified for Canadian youth.

In these studies, the prevalence estimates for the mental health disorders were always higher (to some extent) in street youth than in comparison populations. Some of the results shown in Table 3 suggest a social class effect, however. In the Fort Lauderdale and Oregon studies, prevalence figures among street youth were compared to those in general populations of subjects of similar ages, and differences were

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marked. By contrast, in the Detroit study, McCaskill et al. (1998) matched homeless and housed adolescents for neighbourhood, and prevalence of alcohol abuse and dependence, and of depression/dysthymia were somewhat closer in value.

**Table 4: Victimization of Runaway Youth in Toronto (n=187)  
(Janus et al., 1995)**

**TABLE IV**  
**Victimization of Runaway Youth in Toronto (n=187)<sup>65</sup>**

Type of Victimization	Proportion Affected (%)
Punched with a closed fist	56
Threatened with a weapon	51
Kicked	39
Something thrown at you	30
Thrown around the room	27
Assaulted with a weapon	26
Head banged on wall/floor	26
Intentionally burned	12

The general pattern of increased prevalence of mental health problems described above is also reflected in other studies conducted in Canada, the United States, and Australia, using scales not designed to yield DSM-compatible diagnoses (Dadds et al., 1993; McCaskill et al., 1998; Rotheram-Borus, 1993; Smart et al., 1994; Stiffman, 1989). Canadian results are summarized here.

In Toronto, Smart et al. (1994) compared 217 street youth to 199 students with respect to depression and alcohol problems, using the CAGE questionnaire (Mayfield et al., 1974) and items from the Centre for Epidemiologic Studies Depression Scale (Radloff, 1977). Greater percentages of street youth reported alcohol problems and feelings of depression. Smart et al. (1993) also reported that low self-esteem and the number of months having lived in a hostel were associated with higher depression scores. In other analyses of Toronto subjects, the number of previous street experiences and length of time on the street were associated with suicide attempt (McCarthy & Hagan, 1992).

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### *Pregnancy*

Greene and Ringwalt (1998) compared pregnancy histories of three groups of female youth aged 14 to 17 years in the United States: a representative sample of 169 runaway and homeless youth residing in 23 funded shelters in metropolitan areas, a convenience sample of 85 street youth living in 10 American cities, and a nationally representative sample of 1,609 household youth included in the 1992 National Health Interview Survey. Youth living on the street had the highest lifetime occurrence of pregnancy (48.2 percent), followed by youth residing in shelters (33.2 percent), and household youth (7.2 percent). Twenty percent of the street youth, 12.6 percent of the shelter youth, and 1.5 percent of the household youth reported two or more pregnancies. No equivalent study, comparing street and household youth in Canada, was identified.

### *Victimization while on the street*

Street youth experience high levels of violence and victimization of various kinds, both before leaving home and while on the street (Janus et al., 1995; Kipke et al., 1997; Kufeldt & Nimmo, 1987; Noell et al., 2001b; Rohde et al., 2001; Whitbeck et al., 1997). Results presented in Table 4 confirm the importance of this phenomenon in Toronto: a very large proportion of runaway youth reported being physically abused or assaulted, threatened, or subjected to other similar abuse during street living. In Calgary, more than 50 percent of a sample of 489 runaway and homeless youth indicated having been approached to participate in illegal activities (Kufeldt & Nimmo, 1987).

### *Mortality*

Street youth experience high mortality rates (Hwang, 2000; Hwang et al., 1997; Roy et al., 1998; Roy et al., 2002b; Shaw & Dorling, 1998). In Montreal, the mortality rate among 1,013 street youth over a two-year follow-up period was 0.89 deaths per 100 person-years, which corresponded to 11 times the rate expected for subjects of corresponding age and sex in the province of Quebec (Roy et al., 1998, 2002b). Twenty-six deaths were observed, including 13 suicides, 8 associated with overdose, and 2 traumatic deaths. In Toronto, the age-adjusted mortality rate ratio was 8.3,

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comparing men 18 to 24 years old using homeless shelters to men in the general population; the leading causes of death were unintentional poisonings, other accidents, and suicide (Hwang, 2000).

## Discussion

Our review indicates that street youth are affected by several problems, including infections, mental health disorders, and high mortality. Epidemiologic studies quantifying specific disease risks in street youth, however, remain limited; only a single estimate, for example, is currently available on the incidence of HIV infection (Roy et al., 2003). Studies of mental health problems present several important limitations. Only three of the 25 studies we reviewed on this topic included a comparison group of non-street youth (Dadds et al., 1993; McCaskill et al., 1998; Smart et al., 1994). Of the remaining 22 studies, only 12 provided a comparison of their results for street youth with literature results for non-street young people (Greenblatt & Robertson, 1993; Greene & Ringwalt, 1996; Hier et al., 1990; Kipke et al., 1997a; Robertson et al., 1989; Rotheram-Borus, 1993; Smart & Adlaf, 1991; Stiffman, 1989; Warheit & Biafora, 1991; Whitbeck et al., 2000; Yoder, 1999). No longitudinal studies providing incidence data for mental health problems appear to exist. Similarly, the important question of victimization of street youth remains poorly investigated: research instruments require further development, standardization, and validation and studies comparing the experience of street and non-street youth are needed. No or very limited data are available on various other outcomes such as dental health, reproductive history, and various infections.

The need for Canadian data is particularly acute in specific areas. Only 6 of the 25 reviewed studies on mental health problems were conducted in Canada (Adlaf et al., 1996; McCarthy & Hagan, 1992; McCormack et al., 1986; Smart & Adlaf, 1991; Smart & Walsh, 1993; Smart et al., 1994) and none assessed DSM-compatible psychiatric diagnoses. No study of youth pregnancy, comparing street and non-street young people, has been reported in Canada. As well, no data are available on important sexually transmitted infections such as herpes virus infection and syphilis.

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Our review presents several limitations. The street youth populations under study were very heterogeneous. The general epidemiologic profile of the different urban populations among which street youth live also differs, thereby affecting risks for various diseases and the interpretability of some results. Comparison populations of non-street youth were rarely included in the reviewed studies, and comparative figures obtained from other sources are affected by various limitations such as differences in geographic areas covered and age groups included.

In summary, current research results are useful to orient public health interventions for street youth, but further epidemiologic research is required to better define the needs of this vulnerable population.

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