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The costs of services for homeless people with mental illness in five Canadian cities : Results from a large prospective follow-up study

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None of the authors declare any competing interests.

Contributors: All of the authors contributed substantially to the conception and design, acquisition of data, or analysis and interpretation of data. Eric Latimer drafted the manuscript, and the remaining authors revised it critically for important intellectual content. All of the authors gave final approval of the version to be published, and agreed to act as guarantors of the work.

Funding/Support: This research has been made possible through a financial contribution from Health Canada.

Word Count: Abstract: 250; Body of article, excluding acknowledgements: 5,960.

ABSTRACT

Background: Limited evidence on the costs of homelessness in Canada is available. We estimated the average annual costs, in total and by cost category, that homeless individuals with mental illness incur, from the perspective of society. We also identified individual characteristics associated with higher costs.

Methods: As part of the At Home/Chez soi trial of Housing First for homeless people with mental illness, 990 individuals were assigned to the treatment-as-usual group, in five Canadian cities: Vancouver, Winnipeg, Toronto, Montreal and Moncton. They were followed for up to two years. Questionnaires ascertained service use and income, and city-specific unit costs were estimated. Costs were adjusted for site differences in sample characteristics. Generalized linear models were used to identify individual-level characteristics associated with higher costs.

Results: Useable data were available for 937 (95%) individuals. Average costs per person per year excluding medications in Vancouver, Winnipeg, Toronto, Montreal and Moncton were, respectively, \$53,144 (95% CI \$46,297 to \$60,095), \$45,565 (95% CI \$41,039 to \$50,412), \$58,972 (95% CI \$52,237 to \$66,085), \$56,406 (95% CI \$50,564 to \$62,456), and \$29,610 (95% CI \$24,995 to \$34,480). Net costs ranged from - \$15,530 to \$341,535. Distributions of costs across categories varied significantly across cities. Lower functioning and a history of psychiatric hospitalizations were the most important predictors of higher costs.

Interpretation: Homeless individuals with mental illness generate very high costs for society. Programs are needed to reorient this spending towards more effectively preventing homelessness, and towards meeting the health, housing, and social service needs of homeless people.

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Confidential

INTRODUCTION

An estimated 35,000 Canadians are homeless on any given night, and over 235,000 experience homelessness over the course of a year (1). In some jurisdictions, the discussion has shifted towards how homelessness can be ended, rather than on how to manage it (1, 2). Ending homelessness will require resources in the form of targeted prevention interventions (2), development of affordable housing, and a variety of housing and support programs such as Housing First, in which homeless individuals are offered immediate access to permanent housing together with long-term, individualized support (3). Arguments for additional government expenditures on programs to end homelessness can be better framed if the costs of maintaining the status quo are well understood. To this end, estimates of the costs of homelessness need to be obtained.

Limited information is available on the economic costs that homeless individuals generate in Canada. Based on a sample of 10 individuals, service and shelter costs of homeless people in 1998-1999 were estimated to range from \$30,000 to \$40,000 per person on average in British Columbia (4). Relying on these estimates and combining them with data from a variety of other sources, a subsequent report from British Columbia placed the cost of health, social and justice services at over \$55,000 per year for people who are absolutely homeless, in 2006 dollars (5) (over \$63,000 in 2016 dollars). A study conducted in Calgary, using 2006 – 2007 data, used a different approach: an estimate of total costs engendered by homeless people was divided by a weighted sum of numbers of transiently and chronically homeless people. This study reported substantially higher costs: \$72,444 per person per year for transiently homeless people to \$134,642 for chronically homeless people (6) (about \$87,000 and \$161,000 in 2016 dollars, respectively). (7)

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3 The present study draws from the Canadian At Home/Chez Soi study, a multi-site randomized
4 controlled trial of Housing First that assembled a large sample of individuals with mental illness
5 who either were absolutely homeless at the time of recruitment, or were precariously housed and
6 had a recent history of absolute homelessness (8-10). Using data from participants assigned to
7 the control group, who were receiving usual services in their city, our objectives were to: (1)
8 estimate the average annual net cost of resources spent per person on homeless people with
9 mental illness, by city and by cost category; (2) identify individual characteristics that predict
10 higher costs.
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22 **METHODS**

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26 The pan-Canadian At Home/Chez Soi project used a randomized trial design to test the Housing
27 First approach in 5 Canadian cities: Vancouver, Winnipeg, Toronto, Montreal and Moncton (8-
28 10). Between October 2009 and June 2011, 2,148 homeless individuals with mental illness were
29 randomized to the main trial. They were followed for up to two years in a standardized manner,
30 until March 31, 2013. Of these, 1,158 were randomized to the Housing First intervention, and
31 990 to treatment as usual (11). Using questionnaires administered at regular intervals,
32 comprehensive psychometric and resource use data were collected over a two-year period. This
33 report uses data from the 937 individuals (95% of the original sample) who received usual
34 services and for whom we had useable data.
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47 **Sample**

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49 To be included in the study, individuals needed to: (1) be of legal adult status; (2) be absolutely
50 homeless or precariously housed; and (3) have a serious mental disorder, with or without a co-
51 existing substance use disorder. People who were currently receiving services from another
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3 Assertive Community Treatment or Intensive Case Management team were excluded, as were
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5 people who did not have legal status in Canada and thus were not eligible for government
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7 benefits.
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11 Participants were recruited through a combination of methods, including referrals from shelters,
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13 hospital emergency departments and other service providers; outreach in shelters and in other
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15 locations where homeless individuals were known to be found; and self-referral. Legal adult
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17 status meant being 18 or older, except in Vancouver where the threshold age was 19. Participants
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19 needed to be either absolutely homeless or precariously housed at the time of the screening
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21 interview. Absolute homelessness was defined as having had no fixed place to stay for more
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23 than seven nights with little likelihood of obtaining accommodation in the upcoming month or
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25 being discharged from an institution, prison, jail or hospital with no fixed address. Being
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27 precariously housed was defined as having a Single Room Occupancy (SRO), rooming house or
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29 hotel/motel as one's primary residence, and also having had two or more episodes of being
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31 absolutely homeless (as just defined) in the previous year. Study participants also needed to
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33 have one or more of six mental disorders: major depression, manic or hypomanic episode, post-
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35 traumatic stress disorder, mood disorder with psychotic features, or current psychotic disorder,
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37 with or without co-occurring substance use disorder, as determined by Diagnostic Statistical
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39 Manual (DSM)-IV criteria on the Mini International Neuropsychiatric interview (MINI) at the
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41 time of entry. In some ambiguous cases, additional evidence was obtained, with participants'
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43 consent, from their medical records (8).
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52 The overall sample size of the At Home/Chez Soi study was calculated so that each site would
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54 be able to detect an effect size of 0.5 between the experimental and control groups for the major
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56 outcome variables, with an α of 0.05 and a β of 0.20. This was estimated to require 63 available
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3 individuals per treatment group, or an initial sample size of about 100 per group assuming 40%
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5 attrition (8).
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9 Figure 1 describes how the final sample of 937 individuals for whom we had useable data was
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11 obtained. A total of 29 individuals in the treatment-as-usual group were identified as having died
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13 during the follow-up period. Among these, 20 had at least one completed Health Services and
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15 Justice Services Utilization questionnaire (which all participants did since the first was
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17 completed at baseline prior to randomization) *and* one Residential Time-Line Follow-Back
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19 questionnaire (the first being administered at 3 months). These 20 individuals were still included
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21 in the analysis. However, their imputed average costs were down-weighted in computing
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23 average costs, in proportion to the time from baseline until their death.
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28 **Measures**

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30 Demographic variables were collected at baseline, while several measures of physical and mental
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32 health status, functioning, quality of life and other domains were collected at baseline and
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34 subsequently at 6-month intervals over the follow-up period (8). The latter included the
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36 Multnomah Community Ability Scale, a well-validated measure of functioning, which was filled
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38 out by the interviewers, at the conclusion of the interview, on the basis of their observations and
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40 interview responses provided by participants (12, 13). All other study instruments were self-
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42 reported.
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49 Three additional instruments were used to capture resource use and income. The Health, Social
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51 and Justice Service Use questionnaire, developed specifically for this study, asked about all non-
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53 overnight health and justice-related services that occurred in the past 30 days for visits to or by
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55 health and social service providers outside hospitals, or in the past 6 months for other events
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3 judged to be either high in saliency (e.g., emergency room (ER) visits, arrests) or likely to occur
4 with regularity (e.g., visits to drop-in centers). Two other instruments were administered at 3-
5 month intervals. The Residential Time-Line Follow-Back asked participants to reconstruct
6 where they were staying every night since the previous interview. It was adapted to each city in
7 our study (as types of places people can spend a night in vary to some extent by city) from an
8 instrument originally developed for New York City (14). The Vocational Time-Line Follow-
9 back questionnaire based on an instrument developed for another study (15), asked about income
10 received month-by-month, by source, and any regular or casual work obtained, during the
11 previous 3 months. It also asked about contacts with the police and involvement with the
12 criminal justice system. The validity of these three instruments has been partially established
13 from a comparison with administrative data at the Vancouver site (16).
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30 Most participants (84%) were followed for 24 months. Follow-up was reduced to 21 months for
31 a minority (16%) of participants for budgetary reasons unrelated to participant characteristics
32 (11).
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38 Due to the length of the baseline interview, the Vocational Time-Line Follow-Back and
39 Residential Time-Line Follow-Back questionnaires were administered for the first time at the 3-
40 month interview, with the latter asking also about the 3 months prior to baseline. Whereas the
41 longer interviews conducted every 6 months as well as the final interview were carried out in
42 person, the shorter interviews at 3, 9, 15 and 21 months (except where the 21-month interview
43 was the final interview) were normally carried out by phone.
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52 With a view to being able to assign costs to service use, the Residential Time-Line Follow-Back
53 recorded simultaneous places of residence – for example, if a participant had an apartment and
54 was hospitalized, both places were recorded. The Vocational Time-line Follow-back
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3 questionnaire recorded in detail participants' sources of income, both legal and illegal. We
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5 subtracted from the costs attributed to an individual both casual and regular employment income.
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7 Reported income from illegal activities (e.g., sex work, drug dealing) was marginal on average
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9 (17) and, due also to significant externalities making its proper valuation difficult, was not taken
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11 into account here. Undeclared casual work, including income from busking, however, was
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13 included. Income from pan-handling as well as gifts from family members were treated in the
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15 same way as income from welfare or disability benefits. Loans from family members were
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17 assumed to be eventually returned and were ignored.
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22 Further details on the study methods and instruments used are provided elsewhere (8).
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26 Our questionnaires did not cover the use or cost of medications, due to the difficulty of obtaining
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28 reliable information on them as well as due to respondent burden. Furthermore, restrictions on
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30 sharing of administrative data across Canadian provinces prevented us from combining
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32 information on cost of medications at the participant level from administrative databases across
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34 provinces. We did however have access to data on filled prescriptions (for all types of
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36 prescription drugs) for almost all Montreal site participants, from the Québec Health Insurance
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38 Board. Thus we were able to calculate the cost of medications for participants at that site, over
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40 the two-year period of follow-up. This information was used to provide a more comprehensive
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42 estimate of the total cost engendered by homeless individuals, including an estimate of the cost
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44 of medications.
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53 **Procedure**

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3 Participants consented to participate in the study following the screening interviews. Ethics
4 approval was obtained from the local ethics review board at each data-collection site and from
5 the university-affiliated teaching hospital where the coordinating centre was based (18).
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7 Screening and baseline interview data were entered directly into an online database. Once the
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9 interview was completed, immediately before randomization, a computerized algorithm
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11 classified all participants as high-need or moderate-need based on data entered during the
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13 screening and baseline interviews. High-need participants had to have an MCAS score of 62 or
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15 less, and have a current diagnosis of psychotic disorder or bipolar disorder as assessed on the
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17 MINI or have been observed as having a psychotic disorder during the screening, and at least one
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19 of three further conditions pertaining to psychiatric hospitalizations, comorbid substance use or
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21 legal involvement (18). High-need participants were randomized to Housing First with Assertive
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23 Community Treatment or treatment as usual, and moderate need participants to Housing First
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25 with Intensive Case Management or treatment as usual, at all sites except Moncton. There, due
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27 to the smaller number of participants, all participants randomized to the intervention arm
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29 received Assertive Community Treatment. An adaptive randomization algorithm was used to
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31 carry out the randomization (8).
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41 Follow-up methods included: (1) requesting, at baseline, the names, phone numbers and/or
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43 addresses of contacts on whom the interviewer team might rely to help locate participants at
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45 future interview time points, with their consent; (2) providing participants with a toll-free
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47 number to call once a month to keep in touch with the city's interview team, in exchange for a \$5
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49 payment; (3) where possible, and with the participant's consent, ensuring that the social
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51 assistance office update the interviewer team as to any change in address; (4) in some cities more
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3 than others, maintaining a presence in shelters and other locations where homeless individuals
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5 tended to congregate.
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10 11 **Perspective of the economic analysis**

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15 Cost elements were collected and analyzed from a modified societal perspective. Following
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17 Weisbrod (19), we included social assistance or disability benefits as costs. Normally, the
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19 societal perspective seeks to measure the net value of all resources that society gains or expends.
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21 Thus it includes the costs of health care resources, social services such as shelters and day
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23 centers, and justice services such as court appearances or incarcerations. The societal
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25 perspective also subtracts from the value of resources expended, such as those just listed, the
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27 value of goods and services produced through employment, as these offset the resources
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29 expended. Conventionally, transfer payments such as social assistance or disability benefits are
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31 ignored, based on the reasoning that in and of themselves they imply no actual use of resources
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33 (except from any administrative expenses involved in effecting the transfers) (20). In the present
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35 analysis, however, following Weisbrod (19), we included social assistance or disability benefits
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37 as costs. The greater part of these payments is used for the subsistence of homeless individuals,
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39 only a very small minority of which are employed. To a large extent, these payments can be
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41 viewed as representing simply a different form of support than shelters, food banks or other such
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43 services. The inclusion of social assistance and disability benefits as costs, as long as out-of-
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45 pocket payments made by participants for food or shelter are excluded to avoid double-counting,
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47 may also be viewed as consistent with a social cost impact analysis (21-23).
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Estimation of unit costs

We estimated average costs of the various kinds of services that participants reported having received. Unit costs were originally calculated in 2011 Canadian dollars but then inflated to 2016 dollars using the city-specific all-item Consumer Price Index (CPI) reported by Statistics Canada (24). Whenever possible we used a “top-down” approach, i.e., we used financial statements and activity reports to determine the average cost of a service, using direct allocation to allocate overhead costs (20). We also loaded onto the unit costs a component to represent the opportunity cost of land and buildings (25). Using data compiled by the Canadian Institute for Health Information, we added typical physician fees to the costs of hospitalizations as well as outpatient and ER visits. We also used these to estimate the costs of physician services provided in physicians’ own offices. We applied an adjustment to hospital per diems to account for the fact that our population is homeless (26). As differences in unit costs could reflect not simply differences in wage levels but also differences in resource intensity that could influence outcomes, we estimated separate unit costs for each site. We calculated many unit costs at a high level of specificity, distinguishing for example in some cases among different single-room-occupancy providers, unit costs for which could vary considerably depending on the amount of support staff present. This could be done in many cases as interviewers usually recorded place names. Due to resource constraints, in the cases of some unit costs for low-cost (e.g., 911 calls) or low-frequency (e.g., court appearances) services, unit costs estimated at one site (usually Montreal) were extrapolated to other sites (9).

Data analysis

At the Montreal site only, for experimental group participants, it was possible to compare self-reported frequencies of visits and visit durations by and to Housing First clinical team providers

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3 (which were recorded with a specific code) with the programs' data. This comparison matched
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5 the time periods over which the visits were reported by participant, month-by-month. We
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7 calculated, by need level, for home and office visits separately, and separately for number of
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9 visits and duration of visits, the average derived from a detailed analysis of administrative data,
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11 divided by the average obtained from self-reports. This revealed a strong tendency to under-
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13 report number of visits and visit duration, with factors ranging (depending on need level, whether
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15 the reporting is of number of visits or their duration, and whether home or office visits were
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17 involved) from 0.93 (in this one instance, indicating over-reporting) to 3.37. Frequencies of visits
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19 or duration of visits of analogous community-based support providers, for treatment-as-usual
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21 participants, were adjusted using the corresponding multiplicative factor to account for mis-
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23 reporting. This was done at all sites. No adjustment was made to other frequencies or durations
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25 as we did not have comparable data on which such adjustments could have been based. All
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27 subsequent analyses rely on service use levels, and hence costs, adjusted in this manner.
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34 The distribution of total annualized costs per individual, after multiple imputation to address
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36 missing data (see below), was described and plotted using a histogram.
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40 As the relative numbers of high-need and moderate-need participants varied by site, and as
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42 preliminary analyses had shown an association between need level and costs, we calculated
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44 weighted annualized costs per individual by site, where the weights were calculated to equalize
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46 the proportions of high-need and moderate-need individuals across sites. We used as the
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48 common proportion, the average proportion of high-need participants across all the sites (0.43).
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50 Subsequent results (in Tables 2 and 3) incorporate this weighting.
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54 As shown in Table 2, for each site, costs were subdivided into 12 categories, such as emergency
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56 shelters, including any transitional programs, and hospitalizations for physical causes. Due to the
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3 skewed nature of cost data, and the presence of some missing data, bootstrapping (with 500
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5 replications), followed by multiple imputation with chained equations (27, 28) (20 imputations),
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8 was used to estimate means and 95% confidence intervals.
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11 Combining data from all sites, we used generalized linear models (29) to regress total costs and
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13 costs of the three most costly categories against a set of demographic, clinical and baseline
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15 service use predictors selected *a priori*. These variables included: (1) those that contributed to
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17 the algorithm used to classify participants as high need or moderate need; (2) age, sex and
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19 longest period of homelessness as a measure of chronicity of homelessness, variables which
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21 previous research suggested are associated with costs incurred by homeless individuals (30, 31);
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23 and (3) site, which seemed likely to be associated in a systematic way with costs. We estimated
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25 both unadjusted and adjusted associations. Bootstrapping and multiple imputation were used to
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27 calculate effect estimates and 95% confidence intervals.
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33 A comparison, using the Akaike information criterion (AIC), of log link and identity link
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35 functions, and gamma and Gaussian distributions, led to the choice of log-link and gamma
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37 distribution. These were also supported by Pregibon's link test and, for the distribution family,
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39 the modified Park test (29, 32, 33).
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46 RESULTS

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49 Table 1 describes participant characteristics at baseline. As may be seen, the sample as a whole is
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51 about 2/3 male, with an average age of 41 years; about three-quarters have a psychotic or a
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53 bipolar disorder; roughly half have either alcohol or illicit substances abuse or dependence.
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55 Forty percent have had two or more hospitalizations in one of the past 5 years, and slightly more
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3 than a third were arrested in the previous six months. On average, the longest single period of
4 homelessness participants had experienced was 2.5 years. Sample characteristics were roughly
5 similar across sites, the most notable difference being that the rate of alcohol use or dependence
6 in Winnipeg was far higher than at other sites: 68% vs between 33% and 45%.
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12 A complete set of unit costs with their sources is presented in the Appendix.
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17 Figure 2 shows a histogram of unadjusted total costs per year per individual. The distribution is
18 heavily skewed to the right, with a median of \$39,640 and a mean of \$50,810. The 25th and 75th
19 percentiles are, respectively, \$27,030 and \$59,860; the 90th percentile is \$93,165. The minimum
20 is - \$15,530 and the maximum \$341,535. (Seven individuals who consumed very few health,
21 social or justice services but earned significant income had negative costs.)
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30 Table 2 shows adjusted average annualized costs by category and by site. Total costs were
31 similar across the 3 largest cities, Toronto, Montreal and Vancouver, lower in Winnipeg, and
32 significantly lower in Moncton. Some notable differences emerged in the distributions of costs
33 by category across sites. In Toronto, costs for ambulatory visits were higher, and costs for
34 hospitalizations (for both physical and psychiatric reasons) lower, than in Montreal or
35 Vancouver. Costs of police and court appearances were much higher in Toronto than in
36 Montreal or Vancouver. Costs for detox and residential treatment for substance use were lower
37 in Toronto than in Montreal or Vancouver. Costs for supportive housing were especially high in
38 Montreal, nearly double those in the next highest city, Winnipeg.
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51 Table 3 shows the results of the unadjusted and adjusted regressions. The dependent variables
52 were total costs and the three most important costs overall (other than social assistance or
53 disability benefits): ambulatory visits, psychiatric hospitalizations and justice-related costs. (For
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3 the latter, we combined police, court appearances and incarcerations.) Controlling for other
4 factors, total costs were lower in Moncton than in every other city. They were associated with
5 only two other variables: level of functioning, with an increase of ten points on the MCAS,
6 indicating a material increase in the level of functioning, associated with a 15% decrease in costs
7 (95% Confidence interval (CI) 0.80 to 0.91); and having experienced two or more
8 hospitalizations within a year during the five years prior to study entry (history of repeated
9 hospitalizations), which was associated with a 35% increase in costs (95% CI 1.21 to 1.51).

10
11 Still controlling for other factors, history of repeated hospitalizations was associated with a 48%
12 increase in costs of ambulatory visits (95% CI 1.21 to 1.81) and a 510% increase in the costs of
13 psychiatric hospitalizations (95% CI 2.51 to 10.34). Two other variables were associated with
14 the costs of psychiatric hospitalizations: alcohol dependence or abuse at baseline was associated
15 with a decrease of 62% (95% CI 0.19, 0.76), and a 10-point increase in the MCAS with a
16 decrease of 44% (95 CI 0.38, 0.81). Combined justice-related costs were lower for older people
17 (3% decrease for each additional year of age, 95% CI 0.96 – 0.99), 37% lower for women (95%
18 CI 0.47 to 0.84), 53% higher for people with alcohol abuse or dependence at baseline (95% CI
19 1.15 to 2.02), 22% lower per additional 10 points on the MCAS (95% CI 0.67 to 0.92), and 2.47
20 times higher for people who had been arrested in the six months before baseline (95% CI 1.89 to
21 3.23).

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23 We highlight one result from the unadjusted regressions. While an increase of one year in the
24 longest single period of homelessness was not significantly associated with total costs when
25 controlling for other factors, bivariately it is associated with a 3% (95% CI 1.01 to 1.05) increase
26 in total costs – indicating that on average, allowing correlated factors to vary at the same time,
27 total costs of people who have been homeless a longer time tend to be higher.
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3 Finally, the average cost per year of filled prescriptions for the 169 Montreal participants for
4 whom we had such data (out of a total of 183) was \$3,083 (Standard Deviation (SD): \$4,057;
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6 Median: \$1,662; Range: 0 – \$22,826; IQR: \$428; \$3,910).
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10 11 **INTERPRETATION**

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14 In this sample of homeless individuals with mental illness, comprehensive costs per year,
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16 excluding medications, ranged from about \$56,000 per year in Canada's three largest cities to
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18 about \$30,000 per year in Moncton. Data from Montreal indicated that this cost would increase
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20 by about \$3,000 if medications were included. Assuming the cost of medications is similar
21
22 across cities, the costs to society of homeless people with mental illness averaged about \$59,000
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24 per year in Canada's 3 largest cities, about \$49,000 per year in Winnipeg and \$33,000 in
25
26 Moncton. Costs were highly variable across individuals, ranging from - \$15,530 to \$341,535 per
27
28 year when earnings were subtracted from health, social and justice services. Spending on
29
30 different kinds of services also varied greatly across cities. Of particular note, spending on
31
32 psychiatric hospitalizations was much greater in Vancouver and Montreal than in the other cities,
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34 while spending on justice-related costs, not including incarcerations, was much higher in Toronto
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36 than in other cities. Costs of supportive housing were much higher in Montreal than in other
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38 cities. Among the variables we had hypothesized might have been associated with higher overall
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40 costs, only two turned out to be significantly associated with greater overall costs, after adjusting
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42 for other factors : a lower level of functioning; and having had two or more hospitalizations
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44 within one year during the previous five years.
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52 Our overall cost estimate is comparable to that previously reported on the basis of a modeling
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54 study conducted in Vancouver (5), which was over \$63,000 in 2016 dollars. It is significantly
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56 lower than the Calgary estimates of \$72,444 per person per year for transiently homeless people
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3 to \$134,642 for chronically homeless people (6). The difficulty of apportioning many costs such
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5 as those of health care services between homeless and non-homeless individuals may make
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7 systems-level estimation of the costs of homelessness per person an especially perilous
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9 undertaking.
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13 While we are not aware of any comparable cost estimates for samples of people with mental
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15 illness but who are not homeless, we did find a statistically significant bivariate association
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17 between longest single period homeless prior to baseline, and total costs. The odds ratio implies
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19 approximately an 8% increase in annual costs of people with homeless histories corresponding to
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21 the average in our sample (2.5 years), compared to individuals with the least homelessness in our
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23 sample, and a 243% increase for people whose longest single period homeless is 30 years, the
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25 maximum value in our sample. This finding suggests that programs designed to prevent people
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27 from becoming chronically homeless could be highly cost-effective.
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33 The At Home/Chez Soi study deliberately chose not to consider previous service use as an
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35 inclusion or exclusion criterion, focusing instead on level of need. Some of the very ill
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37 individuals who were recruited lived in makeshift shelters and avoided contact with the formal
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39 service system as much as possible. A small number were not chronically homeless and earned
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41 enough income over the two years following study entry to more than offset any health, social
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43 and justice service costs that they incurred. At the other extreme, 10% of individuals incurred
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45 costs in excess of \$93,165, reflecting high use of many services. This indicates that
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47 homelessness reduction strategies can focus interventions on high-cost users (as in (34)), who
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49 present more opportunities for cost savings, or, as in the case of the At Home/Chez Soi project,
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51 on people with the highest level of need, who may not be among the highest-cost individuals. A
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3 mixed strategy, targeting people either with very high costs, or with a very high level of apparent
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5 need, or both, could also be pursued.
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9 Our results also indicate that characterizing usual care for homeless people as relying to a large
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11 extent on emergency responses (35), while true, obscures significant variations across cities in
12
13 the types of care that tend to be delivered at broadly similar overall cost. This in turn suggests
14
15 that even within current overall budgetary constraints, more effective allocations of resources
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17 may be possible: it is unlikely that these variations across sites have no impact on the well-being
18
19 of homeless individuals. In this regard, it is not clear why spending on psychiatric
20
21 hospitalizations is lower, and spending on ambulatory visits higher, in Toronto than in
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23 Vancouver or Montreal. It may be that more treatment-as-usual participants in Toronto were able
24
25 to access Assertive Community Treatment and Intensive Case Management teams, which had
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27 greater capacity per capita in that city. Assertive Community Treatment teams consistently
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29 reduce psychiatric hospitalizations (36, 37). To be included in the trial, individuals could not be
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31 currently receiving services from an Assertive Community Treatment or Intensive Case
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33 Management , but treatment-as-usual participants could have begun receiving such services
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35 during the period of observation. Unfortunately our data did not identify specifically use of such
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37 teams.
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44 Baseline alcohol or drug abuse or dependence did not emerge as predictive of total costs.
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46 Several studies have reported that, among people with severe mental illness, substance use is
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48 associated with higher costs (38, 39). Our findings are not inconsistent with that observation, as
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50 our point estimates, in both adjusted and unadjusted regressions, indicated higher costs in
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52 association with alcohol use at baseline, though not to a statistically significant extent. The
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54 overall near-absence of an association with total costs masks two opposing associations with
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3 components of costs: that alcohol abuse or dependence is associated with an increase in justice-
4 related costs, but also with a reduction in psychiatric hospitalizations. It may be that people with
5 substance abuse tend to be diverted away from inpatient care towards the criminal justice system.
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10 The fact that level of functioning, as assessed by interviewers at the conclusion of the baseline
11 interview using the MCAS, turned out to be more predictive of costs in a multivariate regression
12 than almost any other variable we tested, is significant. It suggests that it is not so much
13 substance abuse, or homelessness history, or specific mental health conditions, *per se*, that
14 predicts costs, but the individual's level of functioning. Given that the MCAS score can also be
15 interpreted as an indicator of level of need, the MCAS could be used efficiently as a tool for need
16 assessment (together with the individual having experienced two or more hospitalizations for
17 mental illness in one of the previous five years, the other variable that turned out to have a
18 significant impact on overall costs controlling for other factors), in service delivery settings.
19 Both these variables are have even larger and more statistically significant odds ratios in
20 multivariate regression, confirming their value as stand-alone predictors. This does not, of
21 course, preclude the possibility of another similarly low-cost approach having greater predictive
22 power still.
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42 The costs of services in Moncton, a much smaller city than the others, are significantly lower
43 than those in the larger cities. Moncton exhibits lower costs for psychiatric hospitalizations and
44 shelters than the three larger cities. Moncton has much lower justice-related costs than most
45 cities, with the exception of Vancouver. We do not know what underlies these differences, and
46 what effects they may have on homeless individuals but they suggest that individuals with a
47 history of homelessness in small cities like Moncton receive much less health and social
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3 It is tempting to use our per-person estimates of the cost of homelessness to derive an estimate of
4 the total cost of homelessness in Canada. Data on relative numbers of homeless people to which
5 our cost estimates could be assigned would be needed to this end, however, but are not available
6 at present. Currently, the most widely-cited estimate of the cost of homelessness in Canada
7 comes from a 2014 report of the Homeless Hub (40). Combining preliminary (and somewhat
8 lower) statistics on costs from the At Home/Chez Soi study with estimates of the numbers of
9 transient (180,000) and chronic (20,000) homeless people in Canada, Gaetz et al. estimated the
10 annual cost of homelessness in Canada to be \$7.05 billion, in 2010 dollars. Using the same
11 method as they did, but with the updated cost estimates provided here, the estimate would rise to
12 \$9.09 billion, in 2016 dollars. However, as the authors acknowledge, their method has
13 considerable limitations. The sample for the At Home/Chez Soi study may over-represent
14 Canada's large cities, in which homeless people appear from our data to incur markedly higher
15 costs. It also includes only people with serious mental illnesses. The annual prevalence of
16 mental illness among homeless people in general is difficult to determine as it depends on who is
17 counted as homeless and how a determination of mental illness is made. Estimates vary widely.
18 A meta-analysis of prevalence of mental illnesses among homeless people reports pooled
19 prevalences of 12.7% for psychotic illnesses, and 11.4% for major depression (41), much lower
20 than in our sample. In Toronto, the 2007 Street Health Report reported that 35% of a homeless
21 sample had received a mental health diagnosis in their lifetime, but 56% indicated they had been
22 seriously depressed in the past year (42). Nor did our sample attempt to be representative of
23 homeless individuals in terms of their chronicity. A more accurate way of estimating the costs of
24 homelessness in Canada would require better estimates of the number of homeless individuals
25 belonging to various subgroups (e.g., chronic homeless individuals living in Calgary), obtaining
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3 a representative sample of each group, ascertaining the costs over one year of each individual in
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5 each sample, and then, finally, constructing a weighted overall cost estimate.
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9 That would be a very costly undertaking and, in our view, unnecessary. Per person estimates
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11 such as derived in the present paper indicate that a great many homeless individuals in Canada
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13 each cost the government, and society more broadly, a considerable amount each year. This,
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15 together with the egregiously poor quality of life and poor health of so many homeless
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17 individuals, is sufficient to justify the search for the most effective, and cost-effective,
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19 programmatic and policy responses to help individuals in such situations, and prevent others
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21 from falling into episodic or chronic homelessness.
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24 25 26 **Limitations**

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29 This study presents several limitations. First, the use of self-reports to measure service use is
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31 subject to error. We have however made a partial adjustment, based on Montreal data, for over-
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33 and under-reporting of visits. Furthermore evidence, including from the present trial, suggests
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35 that while self-reports may either under- or over-report service use, they are fairly reliable (16,
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37 43). Second, although we expended considerable effort on unit cost estimation, the necessity of
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39 making a number of simplifying assumptions in the calculation of unit costs means that these
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41 costs necessarily include some error. These two limitations notwithstanding, the plausibility of
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43 our regression findings, including by cost category, suggests that the costs we have estimated
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45 have considerable validity. Third, we only had data on the cost of medications for one site, and
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47 this has turned out to be non-trivial. There may be significant variation in this cost across sites.
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49 Fourth, only individuals with mental illness, who were homeless or recently homeless at
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51 baseline, with other specific inclusion and exclusion criteria, were included in the sample,
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53 limiting generalizability. Fifth, our costs are influenced by the unit costs estimated for each city.
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3 While this recognizes that, for instance, facilities and staffing offered at emergency shelters tend
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5 to vary across cities, it may also suggest differences in intensity of services that are really the
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7 result of differences in unit costs.
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10 11 12 13 14 **Conclusion**

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17 Our study confirms, on the basis of a much larger sample and much more detailed data than have
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19 been gathered in the past, that homeless individuals with mental illness generate, on average,
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21 very high economic costs for society, from high use of health, social and justice services
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23 combined with income received from governmental benefits rather than employment.
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25 Furthermore, resource allocation patterns vary greatly from city to city. These findings, together
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27 with the well-documented low quality of life and health problems of homeless individuals (44),
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29 suggest the need for a comprehensive response to homelessness, and opportunities for more
30
31 effective allocations of resources even within existing budgetary envelopes. With this goal in
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33 view, plans to end homelessness include not only community mental health responses such as
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35 Housing First that offset some of these costs (45), but also interventions to prevent individuals
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37 from becoming homeless in the first place (2).
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43 44 **ACKNOWLEDGMENTS**

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47 This research was made possible through a financial contribution from Health Canada provided
48
49 to the Mental Health Commission of Canada. The Mental Health Commission oversaw the
50
51 design and conduct of the study. The study's International Standard Randomised Control Trial
52
53 Number Register Identifier is ISRCTN42520374. The authors thank Jayne Barker, Ph.D., and
54
55 Cameron Keller, M.A., the National Research Team, the research teams and coordinators at the
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five sites, numerous service and housing providers, as well as persons with lived experience, who have contributed to this project and the research. The late Dr Paula Goering was the lead investigator of the At Home/Chez Soi project. The views expressed herein solely represent those of the authors.

Confidential

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Figure 1. Flowchart of study participants through the study

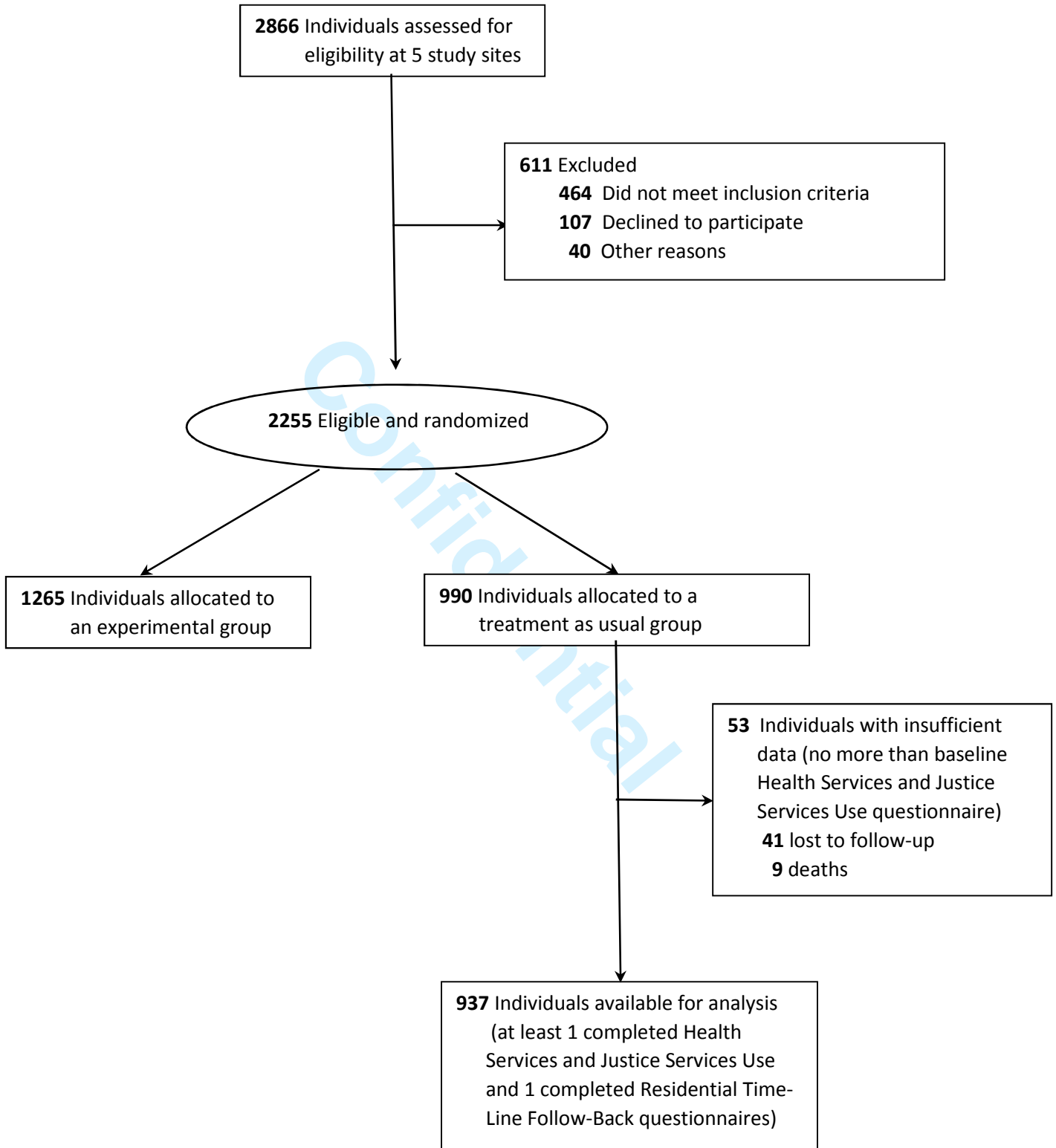


Table 1. Sample characteristics at baseline interview

Sites	Moncton (N=96 ¹)		Montreal (N=183)		Toronto (N=247)		Winnipeg (N=218)		Vancouver (N=193)		Total (N=937) ²	
	n	%	n	%	n	%	n	%	n	%	n	%
Male	61	63.54	135	73.77	183	74.09	136	62.39	137	70.98	652	69.58
Psychotic disorder or bipolar disorder	57	59.38	119	65.03	196	79.35	179	82.11	167	86.53	718	76.63
Alcohol dependence or abuse	38	39.58	62	33.88	111	44.94	148	67.89	64	33.16	423	45.14
Illicit substances dependence or abuse	59	61.46	101	55.19	113	45.75	112	51.38	117	60.62	502	53.58
Two or more hospitalizations in one of past 5 years	30	31.58	80	44.94	106	43.44	54	25.00	94	50.81	364	39.65
Arrested in previous six months	34	35.79	61	33.70	91	36.99	72	33.03	82	43.16	340	36.56
High-needs group	42	43.75 ³	81	44.26	88	35.63	92	42.20	97	50.26	400	42.69
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age (years)	40.38	10.77	43.53	10.24	41.47	12.12	38.59	11.35	41.02	11.01	41.03	11.32
Longest single period of homelessness (months)	18.69	26.69	29.41	37.43	36.74	55.09	27.90	37.86	29.75	38.01	30.01	42.48
MCAS (functioning) score⁴	59.07	8.08	59.58	9.38	61.57	7.05	60.95	7.72	57.28	9.76	59.89	8.52

¹ The numbers of individuals who were assigned to the treatment-as-usual group, by site, were, following the same order: 100, 184, 274, 232, 200.

² Data were missing for additional individuals for three variables: two or more hospitalizations in the previous five years (N=918); arrested in previous six months (N=930); longest single period of homelessness (N=916).

³ Percentage calculated retrospectively using the same algorithm as at the other sites.

⁴ A higher score indicates higher functioning.

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Figure 2. Distribution of total annualized costs per person across the sample (subtracting earned income from health, social and justice service use costs, including social assistance and disability benefits)

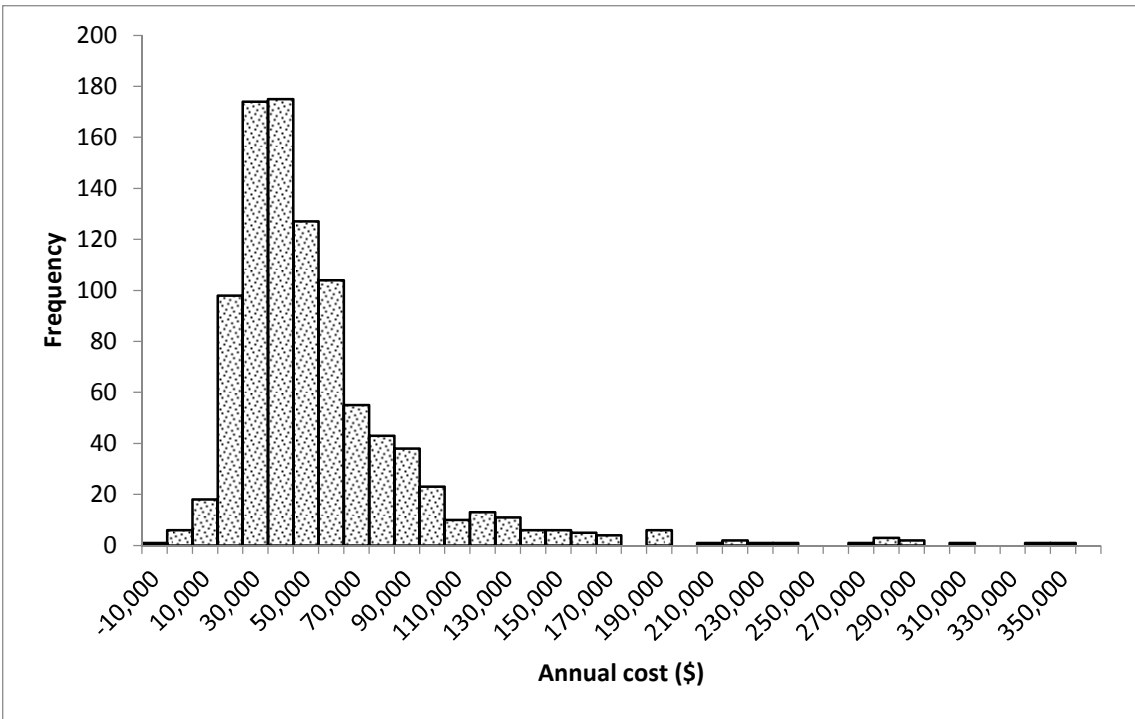


Table 2: Weighted means of costs per person per year (2016 Canadian \$)

Annual costs (2016 Canadian \$) (95% confidence intervals) ¹	Moncton	Montreal	Toronto	Winnipeg	Vancouver
Shelters	2,240 (1,171 – 3,526) ¹	4,244 (3,405 – 5,249)	6,411 (5,411 – 7,219)	1,091 (827 – 1,364)	4,279 (3,328 – 5,461)
Supportive housing²	776 (407 – 1,392)	5,879 (4,450 – 7,523)	1,628 (1,077 – 2,308)	3,271 (2,575 – 4,208)	2,335 (1,476 – 3,327)
Substance use treatment	632 (336 – 1,003)	2,098 (1,289 – 3,046)	1,012 (577 – 1,629)	2,313 (1,580 – 3,049)	2,651 (1,684 – 3,710)
Ambulatory visits	5,642 (3,976 – 7,307)	5,621 (4,523 – 6,720)	12,545 (9,895 – 15,194)	9,019 (7,324 – 10,714)	7,343 (5,555 – 9,131)
ED visits and ambulance	1,148 (938 – 1,385)	1,483 (1,094 – 1,896)	1,699 (1,118 – 2,392)	2,638 (2,009 – 3,364)	1,680 (1,244 – 2,134)
Hospitalizations (physical)	2,762 (745 – 5,699)	4,666 (2,444 – 7,688)	1,104 (502 – 1,821)	3,971 (2,262 – 6,355)	2,879 (1,089 – 4,481)
Hospitalizations (psychiatric)	2,718 (1,215 – 4,431)	9,416 (6,095 – 14,042)	7,475 (3,643 – 12,439)	4,062 (1,773 – 7,678)	11,308 (6,090 – 17,462)
Other – help lines, day centres, etc.	1,422 (1,079 – 1,860)	3,318 (2,702 – 3,898)	2,652 (2,187 – 3,144)	2,768 (2,404 – 3,156)	3,107 (2,670 – 3,605)
Police, court appearances	4,523 (3,491 – 5,556)	6,613 (5,283 – 8,192)	12,393 (9,636 – 15,323)	5,471 (4,524 – 6,522)	4,807 (3,587 – 6,396)
Incarcerations	2,355 (1,117 – 3,733)	3,464 (1,784 – 5,701)	2,547 (1,575 – 3,719)	5,392 (3,685 – 6,950)	3,125 (1,475 – 5,071)
Social assistance/disability benefits	6,958 (6,343 – 7,602)	10,407 (9,906 – 10,849)	10,265 (9,646 – 11,119)	6,995 (6,533 – 7,523)	10,887 (10,341 – 11,497)
Income earned	1,566 (955 – 2,241)	804 (519 – 1,099)	759 (487 – 987)	1,426 (970 – 1,972)	1,258 (775 – 1,864)
TOTAL	29,610 (24,995 – 34,480)	56,406 (50,654 – 62,456)	58,972 (52,237 – 66,085)	45,565 (41,039 – 50,412)	53,144 (46,297 – 60,095)

¹ 95% confidence intervals were obtained by bootstrapping. Twenty (20) multiple imputations were carried out on each of 500 bootstrap replicates. There were in all 301 cost variables for each of 937 individuals, for a total of 282,037 cost elements. Among these, 40,592 (14.39%) were missing.

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² Housing in which support staff are located within the building. Also includes (notably for Toronto) subsidized rooms in buildings without onsite support staff.

Confidential

Table 3: Predictors of costs

Odds ratio ^{1,2}	Ambulatory visits		Psychiatric Hospitalizations		Justice-related services		Total	
	Unadjusted (95% CI)	Adjusted ³ (95% CI)	Unadjusted (95% CI)	Adjusted (95% CI)	Unadjusted (95% CI)	Adjusted (95% CI)	Unadjusted (95% CI)	Adjusted (95% CI)
Sites								
Montreal vs. Moncton	1.00 (0.68, 1.47)	0.98 (0.68, 1.41)	3.75 (1.16, 12.09)	2.34 (0.63, 8.71)	1.52 (0.94, 2.48)	1.28 (0.77, 2.13)	1.94⁴ (1.56, 2.42)	1.85 (1.50, 2.27)
Toronto vs. Moncton	2.12 (1.46, 3.10)	1.99 (1.38, 2.86)	2.50 (0.81, 7.71)	0.93 (0.25, 3.42)	2.16 (1.35, 3.47)	1.57 (0.94, 2.62)	1.94 (1.56, 2.40)	1.77 (1.44, 2.17)
Winnipeg vs. Moncton	1.62 (1.11, 2.36)	1.61 (1.11, 2.32)	1.56 (0.48, 5.02)	1.12 (0.28, 4.44)	1.61 (0.99, 2.61)	1.40 (0.82, 2.39)	1.56 (1.25, 1.94)	1.60 (1.30, 1.98)
Vancouver vs. Moncton	1.37 (0.93, 2.01)	1.13 (0.78, 1.63)	4.76 (1.47, 15.45)	2.77 (0.74, 10.44)	1.22 (0.75, 1.98)	0.76 (0.46, 1.26)	1.85 (1.48, 2.31)	1.58 (1.28, 1.95)
Age (years)	0.99 (0.98, 1.00)	1.00 (0.99, 1.00)	0.99 (0.97, 1.02)	0.96 (0.93, 1.00)	0.97 (0.95, 0.98)	0.97 (0.96, 0.99)	1.00 (0.99, 1.00)	1.00 (0.99, 1.00)
Female vs. Male	1.05 (0.84, 1.32)	1.18 (0.96, 1.44)	0.93 (0.52, 1.65)	1.37 (0.63, 2.95)	0.55 (0.42, 0.71)	0.63 (0.47, 0.84)	0.93 (0.83, 1.05)	1.03 (0.92, 1.15)
Psychotic disorder	1.38 (1.08, 1.76)	1.05 (0.84, 1.33)	3.08 (1.57, 6.06)	2.01 (0.76, 5.28)	1.39 (1.04, 1.87)	1.06 (0.77, 1.45)	1.28 (1.13, 1.46)	1.04 (0.92, 1.18)
Alcohol dependence or abuse at baseline	1.34 (1.09, 1.66)	1.12 (0.92, 1.38)	0.57 (0.32, 1.00)	0.38 (0.19, 0.76)	1.84 (1.42, 2.37)	1.53 (1.15, 2.02)	1.09 (0.98, 1.22)	1.07 (0.96, 1.19)
Illicit drug dependence or abuse at baseline	1.11 (0.89, 1.38)	1.05 (0.86, 1.29)	0.74 (0.43, 1.26)	0.43 (0.21, 0.89)	1.89 (1.46, 2.44)	1.35 (1.02, 1.80)	1.06 (0.95, 1.19)	1.00 (0.89, 1.12)
Longest single period of homelessness (years)	1.01 (0.98, 1.05)	1.00 (0.97, 1.02)	1.05 (0.98, 1.12)	1.05 (0.97, 1.14)	1.06 (1.02, 1.10)	1.03 (0.99, 1.07)	1.03 (1.01, 1.05)	1.01 (1.00, 1.03)
Functioning as measured by MCAS (10 points)	0.84 (0.74, 0.96)	0.87 (0.76, 0.99)	0.41 (0.29, 0.58)	0.56 (0.38, 0.81)	0.75 (0.65, 0.87)	0.78 (0.67, 0.92)	0.81 (0.76, 0.86)	0.85 (0.80, 0.91)
At least 2 psychiatric hospitalizations in one of 5 years before baseline	1.57 (1.28, 1.92)	1.48 (1.21, 1.81)	4.94 (2.83, 8.63)	5.10 (2.51, 10.34)	1.20 (0.94, 1.54)	1.11 (0.85, 1.46)	1.47 (1.32, 1.64)	1.35 (1.21, 1.51)
One or more arrests in 6 months before baseline	1.18 (0.95, 1.46)	1.07 (0.88, 1.30)	0.81 (0.46, 1.43)	0.80 (0.35, 1.83)	2.98 (2.29, 3.89)	2.47 (1.89, 3.23)	1.23 (1.09, 1.38)	1.15 (1.03, 1.28)

¹ Indicates fraction by which costs rise or fall when predictor is equal to 1, or when it increases by 1 unit (10 units in case of MCAS).

² Data were best fit with a log link function and gamma distribution.

³ In the unadjusted columns, each row shows the coefficient and confidence interval from a regression including only that variable; in the adjusted columns, coefficients and confidence intervals from a single multiple regression including all the listed variables are shown.

⁴ Coefficient with a p-value of less than 0.01 (rather than 0.05 due to large number of comparisons), and their 95% confidence intervals, are bolded.

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Appendix. Updated unit costs used for At Home/Chez soi economic analyses (in 2016 Canadian dollars)

Angela Ly, B.Com., M.H.A.
Guido Powell, M.Sc.
Eric Latimer, Ph.D.

Notes on costing approach

This unit cost list was developed for economic analyses derived from the At Home / Chez Soi project, which evaluated a Housing First intervention for homeless and mentally ill individuals. The unit costs estimated for the At Home / Chez Soi project may serve for other health economic evaluations. This list has been supplemented with additional unit cost information on police and education, which may be useful to other health economic evaluations adopting a governmental or a societal perspective. This unit cost list was produced with funding from the Mental Health Commission of Canada.

Overall approach

We sought to estimate the average cost of services. Both direct and indirect costs were included in unit cost estimates. Direct costs are all costs that can be directly related to the production of one unit of service, such as health service provider wage and materials used. Indirect costs include all costs that cannot be directly related to the production of one unit of service, such as administrative costs (ex: human resources department, financial services department, etc.), electricity, maintenance, rent or building capital costs.

Average unit costs *per service* were estimated, as average costs are equal to marginal costs in the long run. Generally, a top-down approach was used for estimating unit costs, whereby total expenses were divided by the total number of units (e.g., yearly shelter expenses divided by bed-nights per year). In some cases (e.g., visits to health, social, and justice service provider; see section 4), a bottom-up approach required accumulating information on components of total expenses. When estimates were calculated for us by representatives of organizations, we ensured that both direct and indirect costs were included.

We calculated unit costs at a high degree of specificity, contacting dozens of providers at each site. In many cases several providers were considered similar and a common unit cost was estimated for all of them, while one or a few providers clearly were more or less costly and separate unit costs were estimated for them. This estimation could be a weighted average of the unit costs of several higher-volume providers.

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4 In this document, in order to protect the confidentiality of several of the providers, we do
5 not report our estimated costs for individual providers but provide a range of unit costs only.
6 The assignment of costs thus makes use of more precise data than is reported here.
7

8 **Opportunity cost of land and buildings**

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10 For the sake of consistency, the unit costs we developed also included the opportunity cost
11 of land and buildings. Services delivered in facilities such as shelters or hospitals occupy a
12 building and land that could be put to other uses if their services were no longer needed.
13 Costing of hospital services typically does not take this into account. In contrast, the
14 expenditure statements of buildings that community organizations occupy often do include
15 costs such as rent. We tried to treat this component of the unit cost in a consistent manner. It
16 can be viewed considered as the foregone capital value of the land and property where services
17 are offered, annuitized over the lifetime of the building.
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21 In many cases, capital cost information was not available. Most government institutions
22 report only operational costs and no information on property value. The book value reported in
23 most community organizations financial statements does not represent the true opportunity
24 costs. The true opportunity cost of the building requires information on the building's *market*
25 value. Often, the property may have been sold to the community organization at a discounted
26 price, as part of a donation, or the building may have been acquired many years ago, when real
27 estate prices were much lower than today.
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30 For government institutions, capital cost percentages estimated by Rosenheck (1994) were
31 used. Rosenheck estimated that capital costs represent 4% of outpatient clinic operational costs
32 and 6% of hospitalisation operational costs. These percentages were added to health
33 institutions' operating costs. Unfortunately, no more recent estimate was available at the time
34 this list was produced and no other capital cost estimate was identified for governmental
35 institutions. Thus, the percentages estimated by Rosenheck were applied to other institutions
36 financed by the government: In the case where sleeping accommodations were involved, the
37 rate of 6% was added; in the case where visits or contacts did not require sleeping
38 accommodations, the rate of 4% was used.
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42 For community organizations, we calculated the rent that they could collect if they were to
43 rent out the building. This rent value represents the opportunity cost. To estimate this rent, the
44 city capital rate for commercial properties (Colliers International Canada, 2010) was multiplied
45 by the city property assessment value¹. Estimates of capital costs from Rosenheck (1994) were
46 also applied to community organizations when property assessment values were not available.
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52 ¹ Unfortunately, there is no city property assessment value for many government-financed institutions (ex:
53 hospitals, prisons, police departments) and it was not possible to use capital rate on government financed
54 institutions.
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Inflation

The base year for unit cost calculations at the outset was 2011. If necessary, when unit costs were first developed (for the At Home/Chez Soi interim and final reports), they were adjusted based on the consumer price index (CPI) to represent 2011 costs. Subsequently, for final analyses, all costs were inflated to 2016 using the city-specific increase in the CPI obtained from Statistics Canada.²

Confidentiality

We often obtained data from specific providers after committing to keeping the unit costs we calculated for them specifically confidential. Accordingly, this level of detail is not provided.

Confidential

² We applied the following inflation rates, from August 2011 to August 2016, using the monthly CPI by city (for Moncton we used the average for New Brunswick): Moncton: 6.88%; Montreal: 6.43%; Toronto: 8.8%; Winnipeg: 9.24%; Vancouver: 6.71%. Although the CPI probably understates the growth in medical costs, if only because the relative price of services tends to rise in comparison to that of manufactured goods, we do not know of a clearly preferable alternative.

1. Ambulatory services

	Moncton	Montreal	Toronto	Vancouver	Winnipeg
Outpatient or Day hospital services	\$265	\$30 – \$980 ^a	\$281	\$292	\$319
Mobile crisis team	248	219	257	273	299
ER visits	372	350	379	419	599
Ambulance transport	984	434	581	667	626
Food bank	6	6	6	6	6
Police contact, including if detained or taken somewhere other than a police cell	160	145	193	181	153
Police cell	257	271	442	442	118
Police arrest	683	620	824	774	653
Court appearance	3283	3269	3342	3278	3356
Drop-in Centres, Community Centres, Meal Programs					
1. Day Centre	35	37	33	21	29
2. Meal program	2	11	4	2	7
3. Other	11	32	25	19	17

Notes

Outpatient or day hospital services

- These unit costs reflect the nature of outpatient clinic visits made by homeless patients with mental illness. They were estimated specifically for the At Home / Chez Soi project, using the research project's data. They are based on the weighted average of outpatient visits costs of the project's Montreal site. The Montreal site data contained specific information on the nature of every outpatient visit. The project data for the other sites did not specify the nature of these visits. The unit costs for other sites were estimated by adjusting the Montreal cost based on a ratio of hospitalisation costs between provinces (province site hospitalisation cost / Quebec hospitalisation cost).

- The Montreal site unit cost was the Hospital cost estimated from Montreal hospitals (Agence de la santé et des services sociaux de Montréal), fee for service for each specialization (Régie de l'assurance maladie du Québec, 2010) and weighting based on the Montreal site At Home/Chez Soi data

ER visits

Values for direct costs per visit were obtained from various governmental sources. The unit cost is the same whether the ER visit involved an overnight stay or not.

- Direct and total emergency room visit costs were only available for the province of Quebec. Using the ratio of total cost to direct cost for Quebec (1.3129), total hospital emergency visit costs were estimated.
- Since emergency room patients usually do not stay overnight, we used 4% of total costs to account for the capital component of the cost of providing overnight stay.
- For Quebec: we used Ministère de la santé et des services sociaux du Québec 2009-2010 data. Fee for service cost to account for the cost of physician services delivered as part of the ER visits was provided by the Canadian Institute for Health Information (CIHI) (2014).
- Vancouver: hospital cost is the average of other provinces (Manitoba, Ontario, Quebec and New Brunswick) fee-for-service costs (CIHI, 2014).
- Winnipeg: direct hospital costs provided by correspondence with the Manitoba Ministry of Health, using Winnipeg Regional Health Authority (WRHA) Emergency Program. Fee-for-service costs (CIHI, 2014).
- Toronto: (Office of the Auditor General of Ontario, 2012) for the hospital cost and (Ontario Ministry of Health and Long-Term Care, 2012) for the fee-for-service cost.
- For New Brunswick: (Government of New Brunswick 2012) for hospital direct cost and (CIHI, 2008) for the fee-for-service cost, adjusted for inflation to 2011 (CIHI, 2014)

Ambulance transports

The values represent unit costs of ambulance dispatches by emergency medical service teams, with or without patient transport. All unit costs were calculated by dividing the average daily expenses for ground ambulance operations by the estimated daily average number of dispatch services.

- To account for capital costs, 4% was added to ambulance dispatch costs.
- For Vancouver: British Columbia provincial average (British Columbia Ambulance Service, 2010)
- For Winnipeg: City of Winnipeg average (City of Winnipeg, 2012)
- For Toronto: City of Toronto average (City of Toronto, 2012)
- For Montreal: City of Montreal average (Urgences-santé, 2010)
- For Moncton: New Brunswick provincial average (Government of New Brunswick, 2012)
- The cost for the province of New Brunswick is much higher than for the other sites. Differing population density may account for this discrepancy. Large cities have a higher population density and more hospitals in a smaller perimeter compared to the rural region covered by the New Brunswick ambulance service.

Day centre visits

“Day centres provide an ‘open access’ building based facility; offer a variety of services usually involving a mix of support, advice, information, food and practical help; are committed to equal opportunities, maintaining a safe and welcoming environment and empowering service users; and have a primary focus on working with homeless, vulnerable or insecurely housed people”(Cooper, 2001). Other specific examples of services that day centres provide include advocacy/housing/legal workers, referrals, nursing staff, literacy programs and other workshops, and computer, phone, laundry, or shower access.

- Because the number and type of services provided by day centres vary from one centre to another, costs per visit may vary substantially from one day centre to another. To best reflect overall service use by homeless people with mental illness, we estimated unit costs based on day centres representing over 50% of total visits by participants in each site of the At Home / Chez Soi project. Costs were estimated as an average weighted by each day centre’s number of visits.
- Amortization expenses were replaced by annuitized land and property market value to account in a consistent way for the capital component of the cost of providing overnight stay.
- For Vancouver: Personal communication with directors or published annual reports of 9 day centres in Vancouver.
- For Winnipeg: Information on 3 day centres in Winnipeg obtained from publicly available figures (opencharity.ca) and budget allocations details from the Social Context of Homeless and Mentally Ill study (Alain Lesage et al.).

- For Toronto: Information on 7 day centres in Toronto obtained from annual reports, financial statements, other publicly available figures (opencharity.ca) and personal communication with directors.
- For Montreal: 2009-2010 annual reports from 12 day centers (Accueil Bonneau 2010, Centre d'amitié autochtone 2010, Chez Doris 2010, Chic Resto Pop 2010, Mission Bon Accueil 2010, Mission Toît Rouge 2010, Multi-Caf 2010, Open Door 2010, Rézo 2010, Rue des femmes 2010, Sac-à-dos 2010, Comité social Centre-Sud 2010.)
- For Moncton: Information on 2 day centres in Moncton obtained from personal communication with directors and budget allocations details from the Social Context of Homeless and Mentally Ill study.

Police contacts

- The values were obtained by multiplying average intervention time by estimated police costs per hour.
- Police time data were provided by Yanick Charette who undertook a study on police intervention time in Montreal (Charette et al., 2011, Charette et al., 2014), including average intervention times by offense type.
- Police costs per hour were calculated by dividing Police department yearly operating expenses by the number of yearly officer work hours.
- For Vancouver: Vancouver Police Department Administrative Report (2012) and Police Resources in Canada (Statistics Canada, 2011b).
- For Winnipeg: Winnipeg Police Service Annual Report (2011)
- For Toronto: Toronto Police Service Annual Statistics Report (2011)
- For Montreal: Service de police de la ville de Montréal, 2009; Service de police de la ville de Montréal, 2012
- For Moncton : City of Moncton Policing Services Study Summary by Perivale & Taylor Consulting (2010)

See Appendices 1 and 2 for details.

Court appearances

- Court costs can vary greatly. A case trial can take 15 minutes or may remain unfinished after one court trial session. Many cases can be heard in one trial for one person. The number of hours worked by the prosecution and the legal

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aid office will also vary. Consequently, although the costs per criminal court appearance presented here represent average criminal court costs per appearance, they may not represent true total costs.

- Legal aid costs are not representative of prices charged in private law firms, who may charge higher fees for certain cases, independently of the hours worked.
- Costs include 4% capital costs
- Due to the time needed to derive such unit costs for Montreal alone, costs for Montreal were assumed to be representative of other sites. Final costs used differ by city only because of different inflation rates from 2011 to 2016.
- For Montreal: court cost per appearance was estimated by dividing court criminal matters expense (Ville de Montréal 2010) by the number of planned trial sessions (Cour municipale de la ville de Montréal 2008). Prosecution cost was estimated by multiplying average court cost by the ratio of prosecution cost to court cost (79%). This ratio was estimated using the Cost of Crime report produced by the Department of Justice Canada (Zhang 2008). Total legal aid expenses were divided by the number of demands (Commission des services juridiques 2010). The total was calculated from the total of expenses detailed above.

2. Costs (per hour except for physicians and dentists) of visits to or by health or social service providers in their office (O) or in community (C) settings

Type of professional	Moncton		Montreal			Toronto		Vancouver		Winnipeg	
	O	C	O1	O2 ^a	C	O	C	O	C	O	C
Addictions Counselor	98	76	0	0	96	118	92	121	94	134	104
Art Therapist	-	-	135	141	106	-	-	-	-	-	-
Case manager	142	124	151	157	115	166	140	152	132	156	135
CFS Worker	-	-	-	-	-	-	-	-	-	156	121
Community worker, Follow-up worker, Street worker	73	56	93	97	73	128	100	100	77	83	64
Conditional Release Officer	-	-	177	185	109	176	137	-	-	-	-
Court worker	142	110	0	0	0	166	128	152	118	156	121
Dentist (<i>per visit</i>)	134	-	133	-	-	136	-	133	-	137	-
Deputy curator or curator	-	-	145	151	114	-	-	-	-	-	-
Family doctor/GP (<i>per visit</i>)	46	46	48	48	48	38	38	37	37	41	41
Life skills worker	98	76	93	97	73	118	92	121	94	134	104
Mental health worker, Housing worker, Outreach worker	\$73	\$56	\$130	\$135	\$102	\$128	\$100	\$100	\$77	\$83	\$64
Midwife	-	-	-	-	-	-	-	-	-	193	150
Nurse	178	138	162	169	127	196	152	189	146	193	150
Nutritionist/dietician	152	118	148	154	116	164	128	169	131	156	121
Occupational therapist	173	134	146	152	115	182	141	188	146	171	132
Peer support worker	73	56	110	114	80	128	100	100	77	83	64
Physiotherapist	176	136	162	169	127	190	147	191	148	175	136
Psychoeducator	98	76	125	130	98	118	92	121	94	134	104
Probation officer	137	106	177	185	139	196	152	167	130	179	139
Psychiatrist (<i>per visit</i>)	59	59	75	75	75	51	51	52	52	101	101
Psychologist	174	135	139	144	109	151	117	176	136	193	151
Public Trustee	-	-	145	151	114	-	-	-	-	144	112
Social worker	142	110	146	152	115	166	128	152	118	156	121
Specialist doctor (not Psychiatrist or Psychologist) (<i>per visit</i>)	58	58	55	55	55	64	64	56	56	55	55

Radiology Technologist	-	-	157	163	123	-	-	-	-	-	-
Spiritual advisor/ counselor /healer, Aboriginal elder, Clergy	83	64	132	137	103	114	89	110	85	106	82
Therapist or counselor	98	76	139	144	109	118	92	121	94	134	104
Welfare worker	73	56	107	111	112	128	100	100	77	83	64
Work/vocational counselor, IPS counselor	107	83	134	140	105	123	96	106	82	126	98

* O2 represents a visit to a provider in an institutional (such as a CLSC), as opposed to a community-based, setting. Questionnaires at other sites did not allow such a distinction to be made.

Notes

Costs per hour for face-to-face visits with health, social and justice service providers are presented above in terms of hours of face-to-face office visits and face-to-face visits in the community. Costs were estimated using a bottom-up approach.

Direct cost

Wages represent the median salary, by city, of different health, social, and justice service providers, obtained from the National Occupation Classification of Canada (Government of Canada, 2012). In cases where city-wide median salaries were not available, provincial medians³ were used. For professions where median salaries were not available, wage information from providers working in similar functions were used.

Indirect cost

To direct costs were added employee leave (vacation, illness, holidays, etc.), employee benefits (health insurance, life insurance, etc.), administration costs and capital costs. These costs are represented as a percentage of employee hourly wages. The percentages are based on Montreal community health centres' outpatient clinics (CLSC) (Agence de la santé et des services sociaux de Montréal). These rates were also applied to social and justice service providers whose working conditions are not administered by a health ministry. However, these working conditions are comparable to those found in the civil service. See Appendix 3 for details.

³ Average salaries were not provided.

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6 *Accounting for time not spent face to face with the client*
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- 9 • Other than face to face contacts with clients, health, social and justice providers also spend time doing administrative
10 tasks and interventions on behalf of the client. Based on limited available information from mental health clinical
11 teams and scientific literature, we estimated that office-based providers spent on average 38% of their time in face-
12 to-face contacts. The corresponding figure is 49% for community treatment teams (details available from the authors).
13 Thus, to account for non-face-to-face time per contact, provider costs were divided by 0.38 and 0.49, respectively.
14 These percentages were also applied to justice providers as an approximation. See Appendix 4 for details.

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16 *Costs of physician services*
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- 19 • The physician costs per visit were added to community health clinic visit costs. These were based on the Montreal
20 costs per visit, adjusted per city based on CIHI average hospitalization costs for each city (CIHI, 2014).
 - 21 • Family doctor, Specialist doctor, and Psychiatrist fee come from tables 3.1, 3.2, and 3.5, respectively, in the Physicians
22 in Canada: Fee-for-Service Utilization 2012-2013 report, and were subsequently inflated to 2016. (Canadian Institute
23 for Health Information, 2014). Community health clinic costs are based on Montreal community health clinic costs
24 (Espace montréalais d'information sur la santé 2010), adjusted per city based on CIHI hospitalization costs.
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3. Crisis or Health Lines

	Moncton	Montreal	Toronto	Vancouver	Winnipeg
Telecare	\$41	-	-	-	-
Other help lines	47	42	49	52	53
911 (emergency)	16	14	17	17	18
Info-Santé	-	36	-	-	-
Suicide help lines	-	71	-	-	-
Conjugal violence help line	-	27	-	-	-
Info-Social	-	90	-	-	-
211 Community Information	-	-	42	-	-
Telehealth Ontario	-	-	42	-	-
Crisis Intervention & Suicide help line	-	-	-	89	-
Manitoba Suicide Line	-	-	-	-	91
Clinic Health Centre and Crisis Lines	-	-	-	-	49

Helpline calls

- For Montreal: Health-line costs were based on 2009-2010 Centre de santé et de services sociaux de la Montagne (Agence de la santé et des services sociaux de Montréal), and Suicide information line costs were based on Suicide action Montréal 2010. Quebec crisis-line costs were based on Centre de crise de Québec
- Capital costs of 4% were added

Mobile crisis team intervention

- The unit costs are representative of mobile crisis team interventions of community organisations in Quebec. These may not be representative of the cost of a mobile crisis team operating from a hospital or a community health centre, which may provide higher wages for its employees.
- For Montreal, costs were from Centre de crise de Québec.
- Capital costs of 4% were added

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911 calls

- This unit cost is limited to the call-centre costs. It does not include the cost of further interventions by other services (ex: ambulance, fire services, police intervention, etc.)
- For Montreal, we used call centre expenses (Service de police de la ville de Montréal) divided by the number of calls (Montréal 2008).

4. Temporary/transitional board and care/group home settings, per night; Long-term group home or Room in long-term congregate setting with supports

	Moncton	Montreal	Toronto	Vancouver	Winnipeg
	cost	cost	cost	cost	cost
		note	note		note
Temporary/transitional board and care/group home settings, per night	\$65	\$20	\$92	\$88	\$73-95 Depending on site
Long-term group home or Room in long-term congregate setting with supports	\$65	\$20 Certain group homes \$51 Other long-term congregate settings with supports	\$58-143 Depending on group home (most common is \$92)	\$82	\$95

Notes

Group Homes refers to shared residences providing living accommodations for individuals with various kinds of disabilities where staff provide supervision, life skills support, and related services, either as temporary or long-term setting.

- Listed costs do not include private residences receiving no public funding in which expenses are fully borne by participants. To have included such costs would have resulted in double counting since participants' social assistance payments are considered costs.
- 6% was added to the costs to account for the capital component of the cost of providing overnight stay
- For Vancouver: Report from the Centre for Applied Research in Mental Health and Addiction (Patterson et al., 2007), adjusted for inflation.
- For Winnipeg: From communication with director of a Winnipeg non-profit organization providing a group home program used by At Home/Chez Soi participants.
- For Toronto: Weighted average unit costs based on 2010-2011 financial statements, annual reports, and communication with directors of 5 non-profit organizations providing group home programs used by At Home/Chez Soi participants.
- For Montreal: Based on two Montreal psychiatric hospitals' 2009-2010 expenses; Douglas Mental Health University Institute and the Institut universitaire en santé mentale de Montréal (Agence de la santé et des services sociaux de Montréal). Psychiatric hospitals manage allocations for mental health residential stays (with or without support services). Unit cost includes allocation and hospital administration cost.
- For Moncton: From unaudited financial statements (opencharity.ca) and communication with director of a Moncton non-profit organization providing a group home program used by At Home/Chez Soi participants. (No private organizations were used in Moncton)

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5. Single-room occupancy (SRO) (with support services)

Moncton	Montreal		Toronto		Vancouver		Winnipeg	
cost	cost	note	cost	note	cost	note	cost	note
\$45	\$144	Female	\$33-96	Depending on specific SRO	\$14-47	Depending on specific SRO	\$10-73	Depending on specific SRO
	\$95	Male						

Notes

Single Room Occupancy (SRO) & non-market housing refers to a combination of SROs, “rooming houses and residential hotels containing small single rooms where residents share common bathrooms and sometimes cooking facilities” and publicly funded, non-market housing with rent geared to income (City of Vancouver, 2010). Levels of services vary from high to low care.

- Listed costs do not include private residences receiving no public funding in which expenses are fully borne by participants
- 6% was added to the costs to account for the capital component of the cost of providing overnight stay
- For Vancouver: weighted averages of reported stays in low service or high service non-market housing and single room occupancy hotels (SROs) run by local non-profit organizations or by the city of Vancouver. Costs obtained from communications with directors or publicly available figures.
- For Winnipeg: Weighted average unit costs based on 2010-2011 annual reports or communication with directors of 3 non-profit organizations providing various types of supportive housing programs used by At Home/Chez Soi participants.

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6. Rooming house, with or without meal service

Moncton		Montreal	Toronto		Vancouver		Winnipeg	
cost	note	cost	cost	note	cost	note	cost	note
\$53-65	Depending on specific rooming house	\$20	\$43-96	Depending on specific rooming house	\$47-144	Depending on specific rooming house	\$80-82	Depending on specific rooming house

Confidential

7. Hospitalizations and other settings involving stays of one or more nights

	Moncton	Montreal		Toronto	Vancouver		Winnipeg	
Type of place	cost	cost	note	cost	cost	note	cost	note
Transitional Housing	\$72	\$72		\$74	\$48		\$74	
Emergency shelter	121	59		69	94		24	
Crisis housing	83	301		69	94		131	
		558	if Dollard-Cormier					
Detox facility	566	127		159	370		362	
		404	if Dollard Cormier					
Nursing home/Long-term care facility	190	219		175	185		187	
Drug/alcohol/addiction treatment (incl. gambling etc.) or residential recovery program	57	127		172	129		178	
		404	if Dollard Cormier		473	if Burnaby		
Psychiatric rehabilitation residential program	65	75		172	53		95	
		398	if Levinschi		473	if Burnaby	484	if Selkirk
Corrections half-way house	106	106		109	107		110	
Hospitalization: General hospital – physical, per day	1131	990		1176	1238		1349	
Hospitalization: General hospital – psychiatric, per day	891	597		812	908		759	
Hospitalization: Psychiatric hospital, per day	980	637		919	999		834	
Jail or prison								
Police detention cell	257	271		402	442		118	
Provincial jail	154	158	if for men	212	194		197	
		192	if for women					
Federal penitentiary	366	365		373	366		375	

Notes

Emergency shelters

Emergency shelters typically provide aggregate sleeping, i.e. many individuals on cots/mats or bunk beds in the same room. The values represent average unit costs of a bed day in emergency shelters.

- Unit costs, with the exception of that for Toronto, were estimated by dividing total shelter expenses by total number of bed days.
- Amortization expenses were replaced by annuitized land and property value to account for the capital component of the cost of providing overnight stay (see introduction)
- For Vancouver, we used 2010-2011 financial statements, annual reports, online statistics, BC Housing estimates, and media reports on the expenses of 4 Vancouver non-profit organizations operating a total of 9 yearly and seasonal emergency shelters.
- For Winnipeg, we used 2010-2011 financial statements, annual reports, and online statistics of 2 Winnipeg non-profit organizations providing emergency shelters. The Social Context of Homeless and Mentally Ill study (Lesage et al., 2011) provided information on percentage of budget allocated to emergency shelters for one Winnipeg organization in our study.
- For Toronto, we relied on information from the Shelter, Support and Housing Administration of Toronto.
- For Montreal, we relied on financial and activity statements from one of the 3 main men's shelters. We were unable to isolate the shelter cost of other shelters. That being said, this estimate coincided for our reference year, 2011, with the shelter unit cost of \$55 estimated by the three largest shelters in Montreal (Mission Bon Accueil, Old Brewery Mission, and Maison du Père).
- For Moncton, we used the 2010-2011 financial statements and online information of a Moncton non-profit organization providing emergency shelter.

Detox facilities

These facilities consist of inpatient withdrawal management programs associated with hospitals as well as programs run by non-profit organizations providing overnight detox beds.

- The value for Winnipeg comes from communication with Manitoba Health Ministry, providing direct costs of a Winnipeg non-profit organization detox unit. Adjustment for indirect costs based on information from the Centre de Réadaptation en Dépendance de Montréal (36%).

- For Toronto, information was obtained from the director of Withdrawal Management Services of one Toronto Hospital. Given its incongruence with costs of other sites, the validity of this cost was assessed by evaluating the calculations performed by our source.
- The higher value for Montreal comes from the Centre de Réadaptation en Dépendance de Montréal 2009-2010 annual report (Agence de la santé et des services sociaux de Montréal).
- The value for Moncton comes from communication with the Addiction, Mental Health, Primary Health Care and Extra-Mural Program branch of the Department of Health (Godin, 2013). 2012 unit cost adjusted for inflation to represent 2011 costs.

Nursing and long term care facilities

Here are meant “nursing homes, homes for the aged and other facilities providing services and care for the aged. Not included are homes for senior citizens or lodges where no care is provided” (Statistics Canada, 2010)

- 6% was added to account for the capital component of the cost of providing overnight stay
- For Vancouver: Statistics Canada (2010). Costs represent the total expenses per bed day of care 143 facilities serving the “aged” across British Columbia.
- For Winnipeg: Statistics Canada (2010). Costs represent the total expenses per bed day of care 63 facilities serving the “aged” across Manitoba.
- For Toronto: Statistics Canada (2010). Costs represent the total expenses per bed day of care 235 facilities serving the “aged” across Ontario.
- For Montreal: Based on 2010/2011 annual reports from 10 long-term care facilities in Montreal (Agence de la santé et des services sociaux de Montréal). Cost was estimated by dividing total facility expenses by total facility bed days.
- For Moncton: Statistics Canada (2010). Costs represent the total expenses per bed day of care 60 facilities serving the “aged” across New Brunswick.

Addiction treatment or residential recovery programs

Here are intended institutionally administered or charity-based residential addiction treatment programs, i.e. “recovery homes” / “sober houses”. For Statistics Canada values, unit costs represent bed days in facilities primarily serving “residents requiring treatment for problems with alcohol or drug addiction”.

- 6% was added to account for the capital component of the cost of providing overnight stay

- 1 • For Vancouver: Statistics Canada (2010). Cost represents the total expenses per bed day of 50 facilities caring for “addiction”
2 across British Columbia. The institutional cost of Burnaby Centre for Mental Health and Addiction was based on review
3 published for the Provincial Health Services Authority by Raymond Chabot Grant Thornton & Cie (2011).
- 4 • For Winnipeg: Statistics Canada (2010). Cost represents the total expenses per bed day of 14 facilities caring for “addiction”
5 across Manitoba.
- 6 • For Toronto: Statistics Canada (2010). Cost represents the total expenses per bed day of 77 facilities caring for “addiction”
7 across Ontario.
- 8 • For Montreal: Average of Centre de Réadaptation Portage (Portage, 2010) and Welcome Hall Mission Addiction Rehabilitation
9 Program (Mission Bon Accueil, 2010). The institutional cost was based on the Centre de Réadaptation en Dépendance de
10 Montréal 2009-2010 annual report (Agence de la santé et des services sociaux de Montréal).
- 11 • For Moncton : Based on 2010/2011 per diem cost of a recovery centre funded by the Horizon NB Health Network, obtained by
12 email correspondence.

19 *Psychiatric rehabilitation program*

- 20 • The following values represent unit costs of centres offering specialized inpatient care for mental health and psychiatric
21 rehabilitation services in institutional settings.
- 22 • Unit costs were estimated by dividing total expenses by total bed days.
- 23 • 6% was added to account for the capital component of the cost of providing overnight stay (Section 1.2)
- 24 • For Vancouver: Cost of Burnaby Centre for Mental Health and Addiction. Based on review published for the Provincial Health
25 Services Authority by Raymond Chabot Grant Thornton & Cie (2011).
- 26 • For Winnipeg: Cost of Selkirk Mental Health Centre obtained from 2010-2011 Annual Report of Manitoba Minister of Health
- 27 • For Montreal: Based on Douglas Mental Health University Institute Maison Levinschi 2009-2010 cost per day (Agence de la
28 santé et des services sociaux de Montréal)

Corrections half-way houses

- The following values represent unit costs of a bed day in facilities run by non-profit organizations providing temporary rooms and reintegration services to individuals released from federal or provincial correctional institutions, either on parole, statutory release, or probation.
- Unit costs were estimated by dividing total expenses by total bed days.
- Amortization expenses were replaced by an annuitized land and property value to account for the capital component of the cost of providing overnight stay (section 1.1.2)
- For Winnipeg and Moncton, 2010-2011 financial statements and online information of a corrections halfway house in each city were obtained. We obtained \$101 and \$99, respectively.
- Toronto and Vancouver unit costs were set to that obtained for Winnipeg, while the Montreal unit cost was set to that for Moncton.

Hospitalizations

- Hospitalization costs per day are the sum of average hospital costs and average physician costs.
- 6% was added to account for the capital component of the cost of providing overnight stay

Non-psychiatric hospitalizations

- We assumed that one medical service was used per day.
- Indirect cost allocation methodology description for values provided by CIHI is described in “Methodology for Calculation of Inpatient Ward and ICU Hospital Per Diem Rates Using the 2009-2010 Canadian MIS Database” (Canadian Institute for Healthcare Information, 2010b). Indirect cost allocation methodology was not available for the estimate provided by the *Ministère de la santé et des services sociaux du Québec*.
- For Vancouver, British Columbia provincial average hospital costs were obtained from Canadian Institute for Healthcare Information (2010a) & fee-for-service costs were obtained from the Canadian Institute for Healthcare Information (2014)
- For Winnipeg, Manitoba provincial average hospital costs were obtained from Canadian Institute for Healthcare Information (2010a) & fee-for-service costs were obtained from the Canadian Institute for Healthcare Information (2014)

- 1 • For Toronto, Ontario provincial average hospital costs were obtained from Canadian Institute for Healthcare Information
2 (2010a) & fee-for-service costs were obtained from the Canadian Institute for Healthcare Information (2014)
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- 4 • For Montréal, provincial average hospital cost provided by the *Ministère de la Santé et des Services sociaux* of Quebec
5 (Ministère de la santé et des services sociaux 2010) and the Régie de l'Assurance maladie du Québec (2010) for the fee-for-
6 service cost
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- 8 • New Brunswick provincial average hospital costs were obtained from Canadian Institute for Health Information (2010a) &
9 fee-for-service costs were obtained from the Canadian Institute for Health Information (2014)
10
- 11 • Based on Hwang et al (2011)., which estimated the difference between hospitalization costs per day for homeless vs non-
12 homeless people, by type of hospitalization (psychiatric vs non-psychiatric), unit costs for all sites were reduced by 17%.
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15 *Psychiatric hospitalizations in psychiatric hospitals*

- 16 • By interviewing three medical chiefs at the Douglas Mental Health Institute, we estimated that doctors visited psychiatric
17 patients twice a week. Thus, it was assumed that the equivalent of 2/7 of psychiatrist service was used per day.
18
- 19 • For Toronto, estimate was based on Jacobs, Dewa et al. 2010.
20
- 21 • For Montreal, city average was estimated by calculating the weighted average of Montreal's two psychiatric hospitals:
22 Douglas Mental Health Institute and the Montreal Mental Health Institute (Agence de la santé et des services sociaux de
23 Montréal). The fee-for-service costs were obtained from the Canadian Institute for Healthcare Information (2014)
24
- 25 • We were unable to access the necessary data to estimate the costs per day in a psychiatric hospital in Vancouver, Winnipeg
26 and Moncton. Using Toronto and Montreal unit costs for psychiatric care in a psychiatric hospital and a general hospital, we
27 estimated that the ratio of psychiatric care in a psychiatric hospital to psychiatric care in a general hospital was 1.0698 in
28 Montreal and 1.1350 in Toronto. The average between these two ratios, 1.1024 was used to estimate the cost of a psychiatric
29 hospitalisation in a psychiatric hospital in the other cities.
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- 31 • Based on the Hwang et al. (2011) study mentioned above, unit costs for psychiatric hospitalizations were *increased* by 9.6%
32 (all sites).
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39 *Psychiatric hospitalizations in general hospitals*

- 40 • By interviewing three medical chiefs at the Douglas Mental Health Institute, we estimated that doctors visited psychiatric
41 patients twice a week. Thus, it was assumed that the equivalent of 2/7 of psychiatrist service was used per day.
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- For Vancouver, British Columbia provincial average hospital costs were obtained from the Canadian Institute for Health Information (2010a), the fee-for-service cost were obtained from the Canadian Institute for Healthcare Information (2014).
- For Winnipeg, Manitoba provincial average hospital costs were obtained from the Canadian Institute for Health Information (2010a), the fee-for-service costs were obtained from the Canadian Institute for Health Information (2014).
- For Toronto, Ontario provincial average for hospital cost comes from “The cost of mental health and substance abuse services in Canada MHCC report” (Jacobs, Dewa et al. 2010) and fee-for-service costs were obtained from the Canadian Institute for Health Information (2014).
- For Montreal, city average was estimated by calculating the weighted average cost of three Montreal general hospitals: *Centre hospitalier de l’Université de Montréal*, the *Centre hospitalier de l’Université McGill* and the *Hôpital Sacré-coeur (Agence de la santé et des services sociaux de Montréal)* and the fee-for-service cost were obtained from the Canadian Institute for Health Information (2014).
- For Moncton, New Brunswick provincial average hospital costs were obtained from the Canadian Institute for Health Information (2010a), the fee-for-service costs were obtained from the Canadian Institute for Health Information (2014).
- Based on the Hwang et al. (2011) study mentioned above, unit costs for psychiatric hospitalizations were *increased* by 9.6% (all sites).

Police detention cells

“Police detention cells” are holding cells used within police departments for detaining individuals. “Intoxicated Persons’ Detention Cell” or drunk tank are detention facilities meant for individuals who are intoxicated and detained for a maximum of 24 hours. Although police cells may also be used as intoxicated persons’ detention cells, drunk tanks are used specifically for intoxicated persons causing disruption in the community. In Manitoba, the City of Winnipeg has subcontracted drunk tanks to a community organization that manages drunk tanks. Police officers and other peace officers may bring an intoxicated person causing disruption in such drunk tank under the Intoxicated Persons’ Detention Act of Manitoba (Government of Manitoba, 1988).

- The unit cost for Winnipeg is based on operating costs of specialized detention cell administered by a Winnipeg non-profit organization. Unit cost was estimated by dividing total expenses by occupancy of detention centre.
- The higher unit cost for Vancouver is based on a source who did not wish to be disclosed.
- The unit cost for Montreal is based on a personal communication with the Service de Police de la Ville de Montréal (amount charged to correctional services for detained individual).

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Provincial jails costs per day

- 6% was added to account for the capital component of the cost of providing overnight stay (Section 1.1.2)
- For all cities except Montreal, Statistics Canada's 2008-2009 Adult correctional services survey was used and then inflated.
- For Montreal, the Ministère de la sécurité publique : Études des crédits 2011-2012 provided costs per day for the Bordeaux prison (for men) and the Tanguay prison (for women)

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Federal penitentiaries

- 6% was added to account for the capital component of the cost of providing overnight stay
- Statistics Canada's 2008-2009 Adult correctional services survey was used, yielding the same average cost for all federal penitentiaries.

Confidential

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Appendix 1. Police time

Police time data were provided by the Yanick Charette who undertook a study on police intervention time in Montreal (Charette, Crocker et al. 2011, Charette, Crocker et al. 2014), including average intervention times by offense type.

Police intervention time involving individuals with or without mental illness, with or without arrest, in minutes (arithmetic mean)

Sample	Outcome	n	Mean	Standard deviation	Median
No presence of mental illness	Arrest	189	322.51	226.95	276.00
	Other outcome	5667	71.27	149.16	39.10
	Total	5856	79.38	158.60	40.63
Presence of mental illness	Arrestation	11	335.49	208.24	367.03
	Other outcome	261	135.79	197.22	84.35
	Total	272	143.86	201.17	85.87
Total	Arrestation	200	323.23	225.49	276.27
	Other outcome	5928	74.11	152.15	40.60
	Total	6128	82.24	161.26	42.22

Use of police time during interventions involving individuals with and without mental illness, in minutes (arithmetic mean) (Charette, 2014)

Reason	Without presence of mental illness			With presence of mental illness			Total		
	n	Mean	Standard deviation	n	Mean	Standard deviation	n	Mean	Standard deviation
Offense against person	213	242.07	386.89	11	216.35	224.94	224	240.8	380.26
Offense against property	496	137.8	138.17	6	131.76	150.02	502	137.73	138.15
Other criminal offense	238	181.3	177.93	6	215.98	98.11	244	182.15	176.36
Potential offense	3784	54.4	134.83	84	106.41	104.72	3868	55.53	134.45
Individual in distress	139	158.76	206.33	93	196.35	296.91	232	173.83	246.74
Noncriminal incident	986	74.93	105.16	72	103.68	99.3	1058	76.88	104.97
Total	5856	79.38	158.6	272	143.86	201.17	6128	82.24	161.26

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Appendix 2. Police cost per hour

- Police cost per hour was calculated by dividing Police department yearly operating expenses by the number of yearly officer work hours.
- Cost figures take into account vacations and holidays. Based on the Service de sécurité publique de la ville de Montréal, it is estimated that police officers work 1456 hours a year.
- Capital costs of 4% were added to the unit cost
- Note that these figures are for 2011 and unit costs were later inflated to 2016

Site	Cost per hour	Source
Vancouver	118.52	Vancouver Police Department Administrative Report (July 2012) and Police Resources in Canada (Statistics Canada, 2011).
Winnipeg	97.72	Winnipeg Police Service Annual Statistics Report (2011)
Toronto	123.76	Toronto Police Service Annual Statistics Report (2011)..
Montreal	95.21	SPVM
Moncton	104.38	City of Moncton Policing Services Study Summary (2010)

Appendix 3. Indirect costs as a percentage of hourly wage of health, social and justice service providers

Indirect cost	% estimated for office visits	% estimated for home visits and in the community	Sources and comments
Vacation, holidays and sick days	12%	12%	Employees in the health institutions usually have 20 vacation days, 6 sick days and 13 holidays, for a total of 39 days. 39 days of paid absence / (365 paid days – 39 days of paid absence) = 12%
Social benefit / Wage	35%	47%	All Montreal community health centres. (Agence de la santé et des services sociaux de Montréal, 2012)
Material costs / Wage	16%	7%	This ratio is based on external clinic cost of all community health centres in Montreal. (Agence de la santé et des services sociaux de Montréal, 2012)
Administration cost / Wage	17%	14%	Indirect cost include teaching, general administration, technical services, computer services, reception, security, maintenance and repairs. Indirect costs were allocated directly to external clinic costs based on number of hours worked, using a direct allocation method. (Agence de la santé et des services sociaux de Montréal, 2012)
Capital Cost	4%	4%	(Rosenheck & Frisman, 1994)

Appendix 4. Estimating proportion of time worked spent face-to-face with clients

1. Office-based providers

Percentages of face-to-face time with clients

Source	%	Comment
Clinical nurse specialist care manager's time commitments in a disease-management program for bipolar disorder (Glick, 2004)	40	Pro: Data based Con: Specific program, VA.
Amine Saadi (chief of Douglas outpatient clinic, psychotic disorders)	60 – 70%	Based on subjective estimate.
André Mpiana (Chief of Douglas outpatient clinic THAI)	Nurse: 36% Other professionals: 38%	The % of time spent face to face with a client will vary with the number of visits. However, it is their objective to meet 4 clients a day. Interviews last between 30 to 50 minutes (average 40 minutes). Nurses work 7 ½ hours and other professionals work 7 hours.
Toronto (program contacted by Brianna Kopp, MHCC)	37.5%	Contacted by Brianna. (refer to e-mail correspondence btw Brianna & Eric) Office visits: 15 hours per week of face to face time out of 40 hours of work time.

Note: All these percentages do correspond to face-to-face time with clients, thus not all direct time as usually defined.

We obtained a convenience sample of percentages of time spent by professionals providing face-to-face care to clients in office-based, clinical services. Except for the 60% estimate which we discount as overly optimistic and unreliable, the four other percentages obtained ranged from 36% to 40%, with a mean of 38%.

Note: Using Work Sampling to investigate time allocation in community mental health centers in Washington state, Stevenson et al. (99) found 51% (+/- 3.03%) as the % of time spent in client-related care activities, including phone contacts and client-related meetings as well as face-to-face time with clients. Since this is a broader measure, it is not inconsistent with it to use 38% for face-to-face time with clients alone.

2. Community outreach programs

Percentages of face-to-face time with clients

Source	%	Comment
Toronto (same service provider as above, this here is for outreach services only)	62.5%	25 hours per week of face to face time out of 40. Only 4 hours of travel time. Relatively long face-to-face contacts.
Chez Soi CSSS JM ICM team	41.4%	This is based on time spent in face-to-face contacts divided by our best estimate of hours actually worked (ie, vacation time taken out as the value of vacation time is built into the cost estimate later).
Chez Soi Diogène ICM team	24.7%	This is based on time spent in face-to-face contacts divided by our best estimate of hours actually worked (ie, vacation time taken out as the value of vacation time is built into the cost estimate later).
Claire Thiboutot: EMRII team	Average: 57% Note: one provider said it that 45% of the time was spent face to face + 15% of transport time.	This is a team that intervenes in situations involving homeless people and the police.

We obtained a convenience sample of percentages of time spent by professionals providing face-to-face care to clients in programs focusing on community outreach. The four percentages obtained ranged from 25% to 62.5%, with the average of the two middle values being 49%.

A. Broader definitions of direct time

Source	%	Comment
Direct and indirect time inputs on ACT (Dewa, 2003)	ACT 1: 54% ACT 2: 60% ACT 3: 51.4% ACT 4: 68.6%	Direct time defined as support given either directly with a client or on behalf of a client that can be apportioned to a specific client.

The fact that 49% is below this set of estimates that include all direct time makes the figure seem more reasonable. It may seem somewhat surprising that percentages for outreach services would be higher than for in-office services. In the case of the Toronto program, this can be explained by the length of time of client visits. For example, during the initial weeks of client interaction, some people might prefer shorter visits (15 minutes). Outreach workers, on the other hand, seem to be meeting fewer clients for longer periods of time

STROBE Statement—Checklist of items that should be included in reports of *cohort studies*

	Item No	Recommendation
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract ✓ (b) Provide in the abstract an informative and balanced summary of what was done and what was found ✓
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported ✓
Objectives	3	State specific objectives, including any prespecified hypotheses ✓
Methods		
Study design	4	Present key elements of study design early in the paper ✓
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection ✓
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up ✓ (b) For matched studies, give matching criteria and number of exposed and unexposed N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable ✓
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group ✓
Bias	9	Describe any efforts to address potential sources of bias ✓
Study size	10	Explain how the study size was arrived at ✓
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why ✓
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding ✓ (b) Describe any methods used to examine subgroups and interactions ✓ (c) Explain how missing data were addressed ✓ (d) If applicable, explain how loss to follow-up was addressed N/A (minimal loss) (e) Describe any sensitivity analyses N/A
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed ✓ (b) Give reasons for non-participation at each stage ✓ (c) Consider use of a flow diagram ✓
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders ✓ (b) Indicate number of participants with missing data for each variable of interest ✓ (c) Summarise follow-up time (eg, average and total amount) ✓
Outcome data	15*	Report numbers of outcome events or summary measures over time N/A

1 2 3 4 5 6 7 8	Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included ✓ (b) Report category boundaries when continuous variables were categorized ✓ (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period N/A
9 10 11	Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses N/A
12	Discussion		
13	Key results	18	Summarise key results with reference to study objectives ✓
14 15 16	Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias ✓
17 18 19 20	Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence ✓
21 22	Generalisability	21	Discuss the generalisability (external validity) of the study results ✓
23	Other information		
24 25 26	Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based ✓

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28 *Give information separately for exposed and unexposed groups.

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30 **Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and
31 published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely
32 available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at
33 <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is
34 available at <http://www.strobe-statement.org>.
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