

Comparing the Housing Trajectories of Different Classes Within a Diverse Homeless Population

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Abstract The paper presents findings from a longitudinal study identifying different classes of homeless individuals in a mid-size Canadian city based on health-related characteristics and comparing the housing trajectories of these classes 2 years later. Using data collected through in-person interviews with a sample of 329 single persons who have experienced homelessness, the paper presents results of a latent class analysis. Results found four distinct latent classes characterized by different levels of severity of health problems—i.e., a class of individuals who are “Higher Functioning” (28.7%), a second class with “Substance Abuse Problems” (27.1%), a third class with “Mental Health Substance Abuse Problems” (22.6%), and a fourth class with “Complex Physical and Mental Health Problems” (21.6%) that included having diminished physical functioning, multiple chronic physical health conditions, mental health difficulties, and in some cases substance abuse problems. Follow-up interviews with 197 of these individuals (59.9%) 2 years later showed the class of individuals with substance abuse problems experiencing the greatest difficulty in exiting homelessness and achieving housing stability.

Implications of these findings for social policy development and program planning are discussed.

Keywords Homelessness · Housing · Latent classes · Health · Functioning · Sex · Age

Available estimates suggest that 150,000–300,000 people will experience homelessness during the course of a year in Canada (Echenberg and Jensen 2008). What is also clear is that the problem has gotten worse over the past two decades. The loss of a federally sponsored social housing supply program in the early 1990s, combined with decreases in federal funding for social assistance, and additional regressive measures on the part of most provinces affecting people with low incomes, have been cited as key public policy reasons behind this increase in the homeless population (Hulchanski 2002). Along with increasing numbers, the population also shows greater diversity. No longer is homelessness characterized simply as a problem of single adult men. In particular, persons experiencing homelessness now also include significant numbers of women, families and youth (Begin et al. 1999; Klodawsky 2006).

Given this growing diversity, developing effective program and policy responses will be helped by research efforts that differentiate the homeless population into typologies. Existing research in this area has focused on specific subgroups of homeless persons such as youth (Adlaf and Zdanowicz 1999; Cherry 1993; Zide and Cherry 1992), families (Danseco and Holden 1998), men (Morse et al. 1991), veterans (Goldstein et al. 2008a, b; Humphreys and Rosenheck 1995) and persons with a severe mental illness (Bonin et al. 2009; Mowbray et al. 1993). All of these studies reported empirically meaningful ways of differentiating clusters of individuals who are homeless.

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A small number of such studies have been conducted on heterogeneous homeless populations rather than on a specific subgroup. Solarz and Bogat (1990) used cluster analysis to identify seven clusters among a group of 125 homeless adults staying at a temporary shelter in a large Midwestern American city. These persons included male adults, female adults, and men and women in families. The subgroups exhibited differences with regard to transiency, psychiatric history, criminal victimization, and criminal activity. The largest subgroup, representing almost half the sample (46%), was relatively free of problems in all four areas.

Morse et al. (1992) used cluster analysis to classify, on the basis of their service needs, a group of 248 homeless men and women staying in adult emergency shelters in St.-Louis. Four subgroups were identified, namely an economically disadvantaged subgroup representing over half the sample (53%), a subgroup characterized by alcohol abuse problems (20%), another subgroup identified as having mental health difficulties (17%), and a socially advantaged group (5%) that included individuals with higher incomes and a greater likelihood of being employed than other subgroup members. Few differences with regard to other background characteristics emerged among the subgroups although those with mental health and alcohol abuse problems showed a greater tendency to use services.

In another study, Kuhn and Culhane (1998) developed a typology of homelessness using administrative data on public shelter use by over 72,000 individuals in New York City (1988–1995) and over 6,800 individuals in Philadelphia (1991–1995). Cluster analyses from the two cities identified three groups (i.e., transitionally homeless, episodically homeless, and chronically homeless) with distinct patterns in terms of number of days spent in emergency shelters and number of episodes in which emergency shelters were used. The transitionally homeless group made up approximately 80% of shelter users in both cities. Individuals in this group were younger, less likely to have mental health, substance abuse, or medical problems, and more likely to be White. Relative to the other clusters, these individuals had experienced fewer episodes of homelessness on average and shorter periods of homelessness. The episodically homeless group represented approximately 10% of shelter users and was more likely than the transitionally homeless to be non-White and to have mental health, substance abuse, and medical problems. Their pattern of shelter use was longer than the transitionally homeless but shorter than the chronically homeless. The chronically homeless group comprised 10% of shelter users and they too were predominantly non-White and had experienced health and substance abuse problems. Their pattern of shelter stays showed the longest periods of homelessness but they experienced fewer discrete episodes of homelessness than those who were episodically homeless.

Munoz et al. (2005) identified three distinct groups among the homeless population in Madrid, Spain. Among the first group, economic problems were the primary issue, while the second group presented with health problems and alcohol abuse. A third group was distinguished by childhood stressful events, a higher level of mental health problems, and excessive alcohol use. The researchers noted the similarity between their findings and those reported in American studies, and highlighted the importance of developing diverse interventions that matched the diverse needs of these populations.

There is some commonality in the results reported from cluster analytic studies on heterogeneous homeless samples. Many of these studies revealed clusters that differentiated people who have been homeless along a continuum according to the severity and complexity of their problems (Kuhn and Culhane 1998; Morse et al. 1992; Munoz et al. 2005). Individuals who comprised a relatively higher functioning group and presented without mental health and substance abuse problems were at one end of the continuum. This group of individuals tended to have the shortest episodes of homelessness. At the other end of the continuum was a severely impaired group who had mental health problems and substance abuse difficulties. Chronic homelessness appeared to be a frequent outcome for these individuals. In between these two extremes were individuals who had experienced a more moderate level of impairment as a result of health problems and/or substance abuse.

To date, the reviewed research has been conducted mostly in the United States with the exception of one study in Quebec, Canada (Bonin et al. 2009) and another in Madrid, Spain (Munoz et al. 2005). As well, as indicated above, much of the research in this area has been limited to examining homogeneous subgroups of people who were homeless and who were categorized on the basis of age, sex, or some other characteristic (Adlaf and Zdanowicz 1999; Bonin et al. 2009; Cherry 1993; Danseco and Holden 1998; Goldstein et al. 2008a, b; Humphreys and Rosenheck 1995; Morse et al. 1991; Zide and Cherry 1992).

Another limitation is that the extant research has been cross-sectional in nature, defining different subgroups of people who have been homeless on the basis of their status at a particular point in time. It remains unknown whether or not the clusters found in these studies are predictive of future housing experiences. Identifying differences between clusters is meaningful from a program and policy development standpoint only if these differences correspond to differential success in exiting homelessness and achieving housing stability.

The longitudinal study described here builds on this line of research. It is intended to address the limitations outlined above by identifying the key health-related

characteristics of distinct classes within a population of youth and single adults who have been homeless, and by examining whether or not these classes differ in their housing trajectories following an episode of homelessness. Specifically, the objective of this study is to enhance our understanding of the diversity of the homeless population based on the presence of various health-related problems that serve as obstacles to overcoming homelessness.

Method

Data examined in this article were drawn from a longitudinal study made up of two in-person interviews with the same individuals, conducted 2 years apart. The initial interviews were completed between October 2002 and October 2003. A second set of follow-up interviews took place 2 years later between October 2004 and October 2005. The goal of the longitudinal study was to examine the factors facilitating and impeding persons who were homeless to re-establish themselves in housing. In the study, “homelessness” is defined as a situation in which an individual has no housing of his or her own and is staying in a temporary form of shelter.

Participants

The study’s full sample was made up of single individuals as well individuals with dependent children. The latter group reported high levels of functioning and were virtually all (97%) housed at follow-up because they were given priority in receiving subsidized housing (Aubry et al. 2007). Therefore, given their distinctiveness relative to single participants in presentation and outcome, it was decided not to include them in the current analysis.

The sampling strategy was designed to yield a representative sample of homeless persons within specific subgroups of single individuals. Single individuals who were homeless were recruited to represent each of the main subgroups of homelessness defined by sex and age, namely adult men and women, and male and female youth. The admission criterion of youth used by local youth shelters was adopted, so that youth were defined as adolescents between the ages of 16 and 19 years old. The sampling goal was to recruit 80 individuals in each of these four subgroups by using either quota sampling or population sampling. An equivalent number of participants in each demographic subgroup were targeted in order for the study to investigate the diversity of the homeless population. Persons were first met in emergency shelters, given that previous research had indicated that over time shelter users make up a very large majority of the homeless population in the City of Ottawa (Aubry et al. 2003).

For quota sampling of adult participants, shelter staff identified potential participants by using sampling guidelines based on the characteristics of that subgroup population as reflected in emergency shelter statistics (Aubry et al. 2003). Recruitment of male adults was done in three men’s shelters and the number recruited from each shelter was based on its proportionate size relative to the others. An overall quota sample was developed from these shelters based on the distribution of length of stay of the population of residents in the men’s shelters in 2001. A quota sample was also used to select female adults. This sample was drawn from a large women’s emergency shelter, from five small shelters for women escaping domestic abuse, and from a residence providing temporary shelter for new immigrants, and it was stratified according to citizenship (i.e., a target of 25% who were non-Canadians) and length of stay based on the profile of residents staying at the largest women’s shelter just prior to the launch of the study.

Population sampling was used for the youth subgroups whereby all homeless youth met at two emergency shelters for male and female youth or at a drop-in centre for homeless youth were invited to participate in the study. Recruitment from these different services was continued until the targeted sample of 80 male youth and 80 female youth was reached.

Initial Interview Sample

A sample of 329 persons completed the initial interviews, made up of 87 men, 85 women, 79 male youth, and 78 female youth (Aubry et al. 2003).

The average age of adult respondents was 38.71 years old (Median = 39.00, SD = 10.54) with over 80% falling between the ages of 20–49 years old. The average age of youth respondents was 17.6 years old (Median = 18.00, SD = 1.09). Only two adult respondents in the sample were 60 years old or older. A majority of male adults (55.7%) and female adults (61%) had completed at least high school. Moreover, at least one-third or more of each of these two subgroups had some post-secondary education. In contrast, 88.5% of male youth and 87.1% of female youth had completed Grade 11 or less. Only a very small proportion of respondents (12.3%) were working for pay. A large majority of male adults (94%), male youth (97%), and female youth (97%) identified themselves as Canadian citizens. Among female adults, 22% were non-Canadians and most of them identified themselves as landed immigrants.

A majority of participants (70.8%) had experienced multiple episodes of homelessness throughout their lives, and 60.5% had been homeless for a relatively short time (less than 6 months) during their most recent period of being homeless. For male adults, inability to pay the rent was the most cited reason (31%), followed by evictions

(21%). Female adults reported eviction as the most common reason (21%), followed by inability to pay the rent (18%). In contrast to adults, among male youth, eviction by parents or guardians (42%) followed by parental conflict or conflict with family (18%) were cited as the most common reasons behind their homelessness. Similarly, for female youth, parental conflict or conflict with family or guardians (27%) and eviction by parents (27%) were the most commonly identified reasons.

Follow-up Interview Sample

The follow-up sample consisted of 197 participants representing a 59.9% follow-up rate. No significant differences were found between those who participated in the follow-up interview and those who did not in terms of sex, age, number of years of formal education, and country of origin. However, respondents in the follow-up interviews had lived in Ottawa ($M = 117.31$ months, $SD = 115.73$) longer than non-respondents ($M = 90.41$ months, $SD = 122.06$) ($t(327) = 2.00$, $p < .05$). In terms of the health variables examined in the study, respondents in the follow-up interviews reported a significantly lower level of physical health ($M = 49.51$, $SD = 9.01$) than non-respondents ($M = 52.81$, $SD = 8.53$) ($t(317) = 3.26$, $p < .001$). As well, respondents in the follow-up interview were more likely to report having been diagnosed with a mental health problem (50%) in comparison to non-respondents (36.7%) ($\chi^2(1) = 5.52$, $p < .02$). No other differences between respondents and non-respondents were found on the health-related variables.

Measures

The present study used measures of mental health functioning, physical health functioning, number of chronic health conditions, lifetime history of having a mental health diagnosis, health care utilization, and alcohol and substance use and abuse to identify distinct classes of respondents. Data on these measures were collected at the point of the first interview when participants were homeless. The study also used a series of housing-related measures in the follow-up interview to collect data on the housing history of participants between the two interviews. These comprised measures of housing status, number of days housed at follow-up, and number of moves between interviews.

Mental Health Functioning

The SF-36 was used to assess the mental health functioning of participants at their initial interview (Ware and Kosinski

2002). Mental health functioning is determined through a series of items that ask about the presence of mental health problems and the extent that these problems limit daily activities. Responses to these items are used to derive a Mental Components Summary (MCS) score. For the MCS score, the total raw score on included items are transformed to a normative score based on the distribution of scores on the MCS within the 1998 U.S. general population with the mean set at 50 and the standard deviation set at 10 (Ware and Kosinski 2002). Both the internal consistency and the test–retest reliability of the MCS has been shown to be good to excellent (Ware and Kosinski 2002). For the present study, the items making up the MCS were found to have a Cronbach's alpha of .88.

Lifetime History of Diagnosis of Mental Health Problems

Respondents were asked, "Have you ever been told by a health care professional that you had mental health problems?" Possible responses were either "yes" (1) or "no" (0).

Physical Health Functioning

The SF-36 was also used to measure a respondent's physical health functioning. Items ask respondents about their physical health and the extent that physical health problems limited their activities. Responses to these items are then used to derive a Physical Components Summary (PCS) score. Similar to the MCS, the total raw score on items making up the PCS are transformed to a normative score based on the distribution of scores on the PCS within the 1998 U.S. general population with the mean set at 50 and the standard deviation set at 10 (Ware and Kosinski 2002). For the PCS, internal consistency and test–retest reliability have been found to be good to excellent (Ware and Kosinski 2002). For the present study, the items making up the PCS were found to have a Cronbach's alpha of .88.

Number of Chronic Health Conditions

A measure created for the National Population Health Survey ([NPHS] Statistics Canada 1999) was used to gather data on chronic physical health conditions. Respondents were asked, "Do you have any of the following chronic conditions that have been diagnosed by a health professional?" and were read a list of 18 conditions including high blood pressure, diabetes and HIV. Answers were recorded in a dichotomous format as either "yes" (1) or "no" (0) and summed so that potential total scores could range from 0 to 18.

Health Care Utilization

Respondents were asked two questions taken from the NPHS: “In the past 12 months, have you been a patient overnight in a hospital, nursing home or convalescent home?” and “Have you been taken to the emergency department in the last 3 months?” Possible answers to each question were either “yes” (1) or “no” (0). Responses to the two questions were summed with potential total scores ranging from 0 to 2.

Alcohol Use

The CAGE questionnaire (Chan et al. 1994) was used to assess the extent of respondents’ alcohol use. The CAGE asks respondents four questions about their alcohol consumption (e.g., “Have you ever felt you ought to cut down on your drinking?”). Possible responses are either “yes” (1) or “no” (0). Total CAGE scores can range from 0 to 4. A total score of 2 or more is indicative of the presence of alcohol use problems (Cherpitel 1997). The CAGE’s sensitivity (its ability to identify the presence of alcohol use problems) has been found to range from 61 to 100%, while its specificity (its ability to identify non-presence of alcohol use problem) ranges from 77 to 96% (Cherpitel 1997). An internal reliability analysis of the measure conducted on data in the present study found a Cronbach’s alpha of .77.

Drug Use

The Drug Abuse Screening Test ([DAST] Skinner 1982) was used to measure participants’ drug use. The DAST asks a series of 20 questions about substance use, such as “Have you used drugs other than those required for medical reasons?” Potential responses to each question are either “yes” (1) or “no” (0). Total DAST scores can range from 0 to 20, with higher scores reflecting a higher level of drug use. A score of 6 or higher on the DAST is considered indicative of a drug use problem (Skinner 1982). The DAST has been shown to have a high internal reliability and good concurrent validity (Cocco and Carey 1998). Internal reliability analysis of the DAST in the current study found a Cronbach’s alpha of .93.

Housing Status at Follow-up

The Housing Income and Services Timeline (HIST) (Toro et al. 1997) was used to query the housing history of participants between interviews. Previous research has shown the HIST to have good test–retest reliability (Toro et al. 1995). Whether or not a participant has exited from homelessness was operationalized as a dichotomous variable: (1) housed—living in a house, apartment, or room

considered one’s own (i.e., for which one pays rent) other than a health, correctional institution, or transitional housing, at the follow-up interview for a period of at least 90 days; or (2) homeless—not having been housed for 90 or more days at the follow-up interview.

Number of Days Housed at Follow-up

Number of consecutive days housed at the follow-up interview was determined through the self-report of participants using the HIST.

Number of Moves Between Interviews

Number of moves between the two interviews was also determined through the information provided by participants about their housing histories in the HIST. Number of moves was deemed to be equivalent to the number of different locations where participants lived, not counting the initial episode of homelessness at the time of the first interview. The number of moves per year was calculated for each participant by dividing the number of moves between interviews by the number of years between interviews (i.e., the number of days between interviews divided by 365 days).

Data Collection

Initial interviews were conducted by a group of 11 trained individuals who were either graduate students in a social science discipline or experienced in interviewing and/or working with people who have been homeless (Aubry et al. 2003). The study’s methodology, including the informed consent process for participants, was approved by the Research Ethics Board for Social Sciences and Humanities at the University of Ottawa. To ensure confidentiality, the interviews took place in a private area within shelters or drop-in centres. The majority of interviews ($n = 299$) was conducted in English, while 26 were done in French. The remaining four interviews were assisted by cultural interpreters, and these were done in Arabic, Lingala, Russian, and Ukrainian. In these latter interviews, the cultural interpreters assisted the participants by translating the English questions when it was necessary. For certain questions, interviewers used response cards to assist participants. The average interview length was 81 minutes. Individuals were paid \$10 for the first interview and \$20 for the second interview.

Tracking procedures were developed 1 year after the first interview took place and involved an attempt to re-contact all participants. At the initial interview, all participants were asked to provide their consent to having the

researchers access their telephone number and address at a later date through the provincial listings of persons receiving welfare or a disability pension. Respondents were also asked to grant permission for researchers to contact family members, friends, and service providers who were likely to know their whereabouts. Approximately 1 year following the first interview, 63% of the original participants were located and reminded about the second phase of the project. At this point of re-contact, permission to contact significant others including service providers who were likely to know their whereabouts was renewed.

Follow-up interviews were conducted in the same manner and by the same types of experienced interviewers as the initial interviews. To ensure confidentiality, interviews were conducted in a secure and private location near the participant's residence. A number of phone interviews ($n = 26$) were also conducted in order to accommodate participants who were residing outside the Ottawa region. The majority of the follow-up interviews were conducted in English (188) and 8 interviews were conducted in French. One interview was conducted in Arabic with the services of a cultural interpreter. The average length of follow-up interviews was 84 min. Interviews conducted over the phone were 10–20 min longer on average than in-person interviews.

Data Analysis

A latent-class (LC) analysis was used to identify the different classes, based on health-related characteristics, within our original sample of persons who were homeless at the time of the initial interview after controlling for age and sex. LC analysis is a probabilistic technique that allows the observation of differences on selected parameters across previously unobserved or hypothesized subgroups (Uebersax 2001). As a result, its use of a statistical model to define classes means that the choice of the class criterion is less arbitrary than in standard cluster analysis, with LC identifying the optimal number of classes (Hagenaars and McCutcheon 2002). Another important advantage of LC over standard cluster analysis is its ability to use categorical or continuous variables in forming classes (Hagenaars and McCutcheon 2002).

For the LC, total scores on the CAGE and DAST were dichotomized to reflect the presence or absence of alcohol use problems or drug use problems. For the CAGE, a score of 2 or more was interpreted as indicative of alcohol use problems and coded as 1; for the DAST, a score of 6 or greater was interpreted as indicative of drug use problems and coded as 1.

One-way ANOVAs were conducted to check for the significance of any differences among the classes on the four continuous variables (i.e., mental health functioning,

physical health functioning, number of chronic health conditions, and health service utilization). Follow-up testing was conducted (using Bonferroni post-hoc analyses) to evaluate pairwise differences among the means. Chi-square analyses were used to compare classes in pairs on dichotomous health variables (i.e., lifetime history of mental health diagnosis, alcohol use problems, and drug use problems).

Results

The optimal solution for the latent class analysis (based on the BIC index) produced four classes of participants with distinct profiles. Class 1 ($n = 89$, 28.7%) participants presented as “Higher Functioning” compared to the other three classes. Unlike the other three classes, participants in Class 1 reported no alcohol use or drug use problems. Class 2 ($n = 84$, 27.1%) participants demonstrated the highest probability of “Substance Abuse Problems”. Class 3 ($n = 70$, 22.6%) participants exhibited the presence of “Mental Health and Substance Abuse Problems”. Finally, Class 4 ($n = 67$, 21.6%) participants presented with “Complex Physical and Mental Health Problems” that included diminished physical health, more chronic physical health conditions along with mental health difficulties and in some cases substance use problems.

Differences Between Classes

Table 1 presents means and standard deviations on health-related continuous variables for each of the classes. For MCS scores (level of mental health functioning), significant differences emerged among the classes ($F(3, 306) = 49.47$, $p < .001$). Specifically, Class 1 (“Higher Functioning”) and Class 2 (“Substance Abuse Problems”) showed a significantly higher level of mental health than Class 3 (“Mental Health and Substance Abuse Problems”) and Class 4 (“Complex Physical and Mental Health Problems”) ($p < .001$). As well, Class 3 (“Mental Health Problems and Substance Abuse”) showed a significantly lower level of mental health than Class 4 (“Complex Physical and Mental Health Problems”) ($p < .01$).

For PCS scores (level of physical health functioning), significant differences also emerged among the classes ($F(3, 306) = 116.70$, $p < .001$). Class 1 (“Higher Functioning”) and Class 3 (“Mental Health Problems and Substance Abuse”) had a significantly higher level of physical health than Class 4 (“Complex Physical and Mental Health Problems”) ($p < .001$). Class 2 (“Substance Abuse Problems”) had a significantly higher level of physical health than both Class 3 (“Mental Health Problems and Substance Abuse”) ($p < .05$) and Class 4

Table 1 Mean and standard deviations or percentage of different subgroups defined by latent class analysis on variables

Variable	Class 1 Higher functioning (<i>n</i> = 89) <i>M</i> (SD) or %	Class 2 Substance abuse problems (<i>n</i> = 84) <i>M</i> (SD) or %	Class 3 Mental health & substance abuse problems (<i>n</i> = 70) <i>M</i> (SD) or %	Class 4 Complex physical and mental health problems (<i>n</i> = 67) <i>M</i> (SD) or %	Between class comparisons
Mental health. functioning	42.83 (13.72)	43.79 (8.21)	25.64 (9.64)	32.28 (10.54)	$F(3, 306) = 49.47, p < .001; 1 > 3, p < .001, d = 1.47, CIs [1.12, 1.83];$ $1 > 4, p < .001, d = 0.88, CIs [0.54, 1.21];$ $2 > 3, p < .001, d = 2.04, CIs [1.65, 2.43];$ $2 > 4, p < .001, d = 1.20, CIs [0.85, 1.55];$ $4 > 3, p < .01, d = 0.66, CIs [0.33, 1]$
Mental health diagnosis (%)		23.8	78.6	62.7	$3 > 1, \chi(1) = 47.46, p < .001, OR = 11.88, CIs [5.60, 25.18];$ $4 > 1, \chi(1) = 24.26, p < .001, OR = 5.44, CIs [2.71, 10.91];$ $3 > 2, \chi(1) = 45.83, p < .001, OR = 11.73, CIs [5.49, 25.09];$ $4 > 2, \chi(1) = 23.28, p < .001, OR = 5.38, CIs [2.66, 10.88];$ $3 > 4, \chi(1) = 4.18, p < .05, OR = 2.14, CIs [1.03, 4.47]$
Physical health functioning	54.61 (6.53)	55.17 (4.93)	52.20 (6.62)	38.37 (6.62)	$F(3, 306) = 116.70, p < .001;$ $1 > 4, p < .001, d = 2.48, CIs [2.05, 2.89];$ $2 > 3, p < .05, d = 0.37, CIs [0.05, 0.68];$ $2 > 4, p < .001, d = 2.83, CIs [2.37, 3.28];$ $3 > 4, p < .001, d = 2.09, CIs [1.67, 2.50]$
Chronic health Conditions	.80 (0.81)	.40 (0.66)	1.90 (1.35)	4.15 (1.90)	$F(3, 306) = 12.31, p < .001; 3 > 1, p < .001, d = 0.96, CIs [0.63, 1.29];$ $4 > 1, p < .001, d = 2.41, CIs [1.99, 2.82];$ $3 > 2, p < .001, d = 1.37, CIs [1.01, 1.72];$ $4 > 2, p < .001, d = 2.52, CIs [2.09, 2.95];$ $4 > 3, p < .001, d = 1.36, CIs [0.99, 1.73]$
Health care utilization	.35 (.64)	.45 (.70)	1.01 (0.83)	.66 (0.77)	$F(3, 306) = 137.15, p < .001;$ $3 > 1, p < .001, d = 0.89, CIs [0.56, 1.21];$ $3 > 2, p < .001, d = 0.74, CIs [0.42, 1.06];$ $3 > 4, p < .05, d = 0.44, CIs [0.11, 0.79]$
Presence of alcohol use problem (%)	0	48.8	64.3	34.5	$2 > 1, \chi(1) = 56.94, p < .001, OR = 169.72, CIs [10.19, 2,825.58];$ $3 > 1, \chi(1) = 79.80, p < .001, OR = 320.40, CIs [19.05, 5,387.42];$ $4 > 1, \chi(1) = 32.24, p < .001, OR = 81.26, CIs [4.81, 1,373.02];$ $3 > 2, \chi(1) = 3.71, p < .05, OR = 1.89, CIs [0.99, 3.62];$ $2 > 4, \chi(1) = 4.70, p < .05, OR = 2.09, CIs [1.07, 4.08];$ $3 > 4, \chi(1) = 14.88, p < .001, OR = 3.94, CIs [1.94, 8.03]$
Presence of drug use problem (%)	0	86.9	88.6	34.3	$2 > 1, \chi(1) = 133.81, p < .001, OR = 1,181.27, CIs [68.27, 20,441.03];$ $3 > 1, \chi(1) = 129.21, p < .001, OR = 1,379.50, CIs [77.91, 24,463.27];$ $4 > 1, \chi(1) = 35.84, p < .001, OR = 93.05, CIs [5.52, 1,568.77];$ $2 > 4, \chi(1) = 44.49, p < .001, OR = 12.70, CIs [5.65, 28.54];$ $3 > 4, \chi(1) = 42.77, p < .001, OR = 14.83, CIs [6.07, 36.19]$

(“Complex Physical and Mental Health Problems”) ($p < .001$).

There also were significant differences among the classes on the measure of chronic health conditions ($F(3, 306) = 137.15, p < .001$). In particular, Class 1 (“Higher Functioning”) and Class 2 (“Substance Abuse Problems”) reported a significantly lower number of chronic health conditions than Class 3 (“Mental Health Problems and Substance Abuse”) and Class 4 (“Complex Physical and Mental Health Problems”) ($p < .001$). As well, Class 3 (“Mental Health and Substance Abuse Problems”) had a significantly lower number of chronic health conditions than Class 4 (“Complex Physical and Mental Health Problems”) ($p < .001$).

Significant differences among the classes also emerged with regard to health care utilization ($F(2, 390) = 12.31, p < .001$). Class 1 (“Higher Functioning”) and Class 2 (“Substance Abuse”) reported a lower level of health care utilization than Class 3 (“Mental Health Problems and Substance Abuse”) ($p < .001$). Class 4 (“Complex Physical and Mental Health Problems”) also reported a lower level of health care utilization than Class 3 (“Mental Health Problems and Substance Abuse”) ($p < .05$).

Table 1 also presents the percentage of health-related difficulties on dichotomous variables (i.e., history of mental health diagnosis, alcohol use problems, and drug use problems) for each of the classes as well as identifying between class comparisons that were significant. In particular, Class 1 (“Higher Functioning”) (23.6%) and Class 2 (“Substance Abuse Problems”) (23.8%) had a lower proportion of individuals reporting that they had received a mental health diagnosis from a professional over their lifetime in comparison to either Class 3 (“Mental Health Problems and Substance Abuse”) (78.6%) or Class 4 (“Complex Physical and Mental Health Problems”) (62.7%) ($p < .001$). The proportion of participants in Class 3 reporting having been diagnosed with a mental health problem was significantly higher than the proportion of participants in Class 4 ($p < .05$).

In line with the characterization of the classes, Class 3 (“Mental Health and Substance Abuse Problems”) showed the greatest proportion of individuals reporting alcohol use problems on the CAGE (64.3%), followed by Class 2 (“Substance Abuse Problems”) (48.8%), Class 4 (“Complex Physical and Mental Health Problems”) (34.5%), and Class 1 (“Higher Functioning”) where there were no participants reporting problems in this area (0%). Differences between Classes 1 and 2, 3, or 4 and between Classes 2 and 4 were significant at the $p < .001$ level. Differences between Classes 2 and 3 and Classes 3 and 4 were significant at the $p < .05$ level.

In terms of the presence of drug use problems as reported on the DAST, both Class 2 (“Substance Abuse Problems”) (86.9%) and Class 3 (“Mental Health and

Substance Abuse Problems”) (88.6%) had a similarly high proportion of participants reporting drug use problems. The proportion of participants with drug use problems for both of these classes was significantly higher than that of Class 4 (“Complex Physical and Mental Health Problems”) (34.3%) or Class 1 (“Higher Functioning”) (0%). Class 4 also had a significantly higher proportion of participants with drug use problems than those in Class 1. All of these differences between classes were significant at the $p < .001$ level.

Proportion of Sampled Subgroups in Different Classes

Table 2 presents the breakdown of the identified classes among the four demographic subgroups in the study defined by sex and age. All of the classes are represented in each of the subgroups. There is a significant difference in the breakdown of classes when comparing the subgroups with one other. Almost one-third of female youth, male adults, and female adults were identified as belonging in Class 1 (“Higher Functioning”). Both male adults (32.5%) and female adults (32.9%) had a significantly higher proportion in this class than did male youth (17.6%) ($p < .05$). The difference between the proportion of female youth (31.1%) and the proportion of male youth in Class 1 approached significance ($p < .06$).

The proportion of male youth (59.5%) in Class 2 (“Substance Abuse Problems”) was significantly greater than the proportion found in the other three demographic subgroups ($p < .01$). Over one-third of male adults (38.8%) were identified as being in Class 2 (“Substance Abuse Problems”). In contrast, a significantly smaller proportion of female youth (9.5%) and female adults (2.4%) were found in Class 2 ($p < .001$). Almost one-half of female youth (47.3%) were found in Class 3 (“Mental Health and Substance Abuse Problems”) compared to significantly smaller proportions for the other subgroups ($p < .001$). Male youth also had a significantly higher proportion in this class (20.3%) compared to male adults (8.8%) ($p < .05$). Similarly, a greater proportion of female adults (49%) were present in Class 4 (“Complex Physical and Mental Health Problems”) than the other three subgroups ($p < .001$). Single men had a greater proportion in Class 4 (20.2%) than male youth (2.2%) ($p < .01$). Female youth also had a greater proportion in Class 4 (12.2%) than male youth ($p < .05$).

Comparison of the Housing Trajectories of Different Classes

As presented in Table 3, 70% of Class 1 (“Higher Functioning”) were housed (i.e., had their own place for 90 days or more) at follow-up, compared to 63% of Class 2

Table 2 Percentage breakdown of sampled subgroups in each class

Class	Male adult (MA) (N = 80)	Female adult (FA) (N = 82)	Male youth (MY) (N = 74)	Female youth (FY) (N = 74)	Between subgroup comparisons
Class 1 Higher functioning (%)	32.5	32.9	17.6	31.1	MA > MY, $\chi^2(1) = 4.53, p < .05$, OR = 2.26, CIs [1.06, 4.83]; FA > MY, $\chi^2(1) = 4.81, p < .05$, OR = 2.30, CIs [1.08, 4.90]
Class 2 Substance abuse problems (%)	38.8	2.4	59.5	9.5	MA > FA, $\chi^2(1) = 32.92, p < .001$, OR = 25.31, 5.80, CIs [5.80, 110.44]; MA > FY, $\chi^2(1) = 17.74, p < .001$, OR = 6.06, CIs [2.46, 14.92]; MY > MA, $\chi^2(1) = 6.60, p < .01$, OR = 2.32, CIs [1.22, 4.42]; MY > FA, $\chi^2(1) = 60.82, p < .001$, OR = 58.67, CIs [13.38, 257.17]; MY > FY, $\chi^2(1) = 40.96, p < .001$, OR = 14.08, CIs [5.68, 34.48]
Class 3 Mental health and substance abuse problems (%)	8.8	15.9	20.3	47.3	MY > MA, $\chi^2(1) = 4.17, p < .05$, OR = 2.65, CIs [1.02, 6.93]; FY > MA, $\chi^2(1) = 28.80, p < .001$, OR = 9.36, CIs [3.81, 23.02]; FY > FA, $\chi^2(1) = 18.05, p < .001$, OR = 4.76, CIs [2.26, 10.06]; FY > MY, $\chi^2(1) = 12.08, p < .01$, OR = 3.53, CIs [1.71, 7.31];
Class 4 Complex physical and mental health problems (%)	20.2	48.8	2.2	12.2	MA > MY, $\chi^2(1) = 11.14, p < .01$, OR = 9.01, CIs [1.99, 40]; FA > MA, $\chi^2(1) = 14.83, p < .001$, OR = 3.80, CIs [1.89, 7.63]; FA > MY, $\chi^2(1) = 41.98, p < .001$, OR = 34.48, CIs [7.87, 142.86]; FA > FY, $\chi^2(1) = 24.21, p < .001$, OR = 6.90, CIs [3.03, 15.63]; FY > MY, $\chi^2(1) = 4.81, p < .05$, OR = 4.99, CIs [1.04, 23.92]

Table 3 Comparison of classes on housing trajectory variables

Measure	Class 1 Higher functioning <i>M</i> (SD) or % (<i>n</i> = 46)	Class 2 Substance abuse problems <i>M</i> (SD) or % (<i>n</i> = 46)	Class 3 Mental health & substance abuse problem <i>M</i> (SD) or % (<i>n</i> = 48)	Class 4 Complex physical and mental health problems <i>M</i> (SD) or % (<i>n</i> = 50)	Between class comparisons
% housed for 90 days or more at follow-up	69.6	63.0	81.3	70.0	3 > 2, $\chi^2(1) = 3.89, p < .05$, OR = 3.05, CIs [1.20, 7.75]
# of days housed at follow-up	379.41 (286.53)	264.89 (266.90)	421.63 (276.39)	375.70 (292.19)	$F(3, 186) = 2.78, p < .05$; 3 > 2, $p < .05, d = 0.56$, CIs [0.15, 0.97]
# of moves/year	1.82 (1.13)	2.39 (1.39)	2.25 (1.39)	1.67 (1.12)	$F(3, 186) = 3.58, p < .05$; 2 > 4, $p < .05, d = 0.61$, CIs [0.19, 1.01]

(“Substance Abuse Problems”), 81% of Class 3 (“Mental Health and Substance Abuse Problems”), and 70% of Class 4 participants (“Complex Physical and Mental Health Problems”). Chi-square analyses found a significant difference between Class 2 (“Substance Abuse Problems”) and Class 3 (“Mental Health and Substance Abuse Problems”) with a higher proportion of Class 3 individuals housed than Class 2 ($p < .05$). No other significant differences emerged in terms of housing status at follow-up between classes.

Table 3 also presents the means and standard deviations for each of the classes on number of days housed at follow-up and number of moves per year between the two study interviews. A One-Way ANOVA found a significant difference among the groups on average number of days housed at follow-up ($F(3, 186) = 2.65, p = .05$). Bonferroni post-hoc comparisons showed a significant difference again between Class 2 (“Substance Abuse Problems”) and Class 3 (“Mental Health and Substance Abuse Problems”) with Class 2 individuals being housed on average for a significantly lower number of days than Class 3 individuals ($p < .05$).

A One-Way ANOVA also found a significant difference among the groups on average number of moves per year. Bonferroni post-hoc comparisons identified a significant difference between Class 2 (“Substance Abuse Problems”) and Class 4 (“Complex Physical and Mental Health Problems”) with Class 2 individuals having a significantly higher number of moves on average than Class 4 individuals ($p < .05$).

Discussion

Distinctiveness of Classes

Results of our study reveal four distinct classes among the single homeless population in terms of the type and severity of health-related problems. The largest class of individuals, making up 28.7% of the sample, report high levels of physical health functioning and no substance use problems. In contrast, a second class of individuals, representing 27.1% of our sample, report alcohol and/or drug use problems. The third class of individuals, making up 22.6% of the sample, indicates the presence of both mental health problems and substance use problems. Finally, the fourth class, comprising of 21.6% of the sample, present with complex and multiple health problems that include lower levels of mental health functioning, lower levels of physical health functioning, and a high number of chronic health conditions.

Our findings, based on data collected in Ottawa, Canada, show similarities to results reported in previous research

that developed typologies of homeless populations in American cities. In particular, these studies reported quite a large subgroup of persons among a homeless population who were relatively free of health difficulties and who had experienced homelessness largely as a result of economic misfortune combined with some kind of breakdown in their housing (Kuhn and Culhane 1998; Morse et al. 1992; Solarz and Bogat 1990). These studies also found subgroups of homeless populations that were characterized by either substance use problems or mental health problems, alone or in combination. Moreover, the portrait that has emerged shows a continuum of problem severity and/or complexity.

A similar continuum appears present in our study with the “Higher Functioning” class at the least severe end of the continuum and the “Complex Physical and Mental Health Problems” class at the opposite end, with the “Substance Abuse Problems” and “Mental Health and Substance Abuse Problems” in between. Although the profile of problems among the different classes supports this continuum, the individuals in “Mental Health and Substance Abuse Problems” reported a significantly greater use of health care. It appears that the presence of concurrent disorders and the severity of mental health difficulties in this class lead to individuals receiving more health care than the class of individuals with more physical health problems but less severe mental health difficulties.

It is noteworthy that the subgroups of people based on sex and age experiencing homelessness show differences in the extent to which they are represented in the four classes. These differences are in line with previous research examining different subgroups of individuals in populations experiencing homelessness. Specifically, studies have highlighted the preponderance of substance abuse difficulties among youth (Adlaf and Zdanowicz 1999; Boivin et al. 2005; Mallett et al. 2005) and male adults facing homelessness (Fischer and Breakey 1991; Hwang 2000; Roll et al. 1999).

Housing Trajectories of Different Classes

Overall, the housing trajectories of the different classes of study participants appeared to be more similar than different. Over two-thirds of participants (70%) had been housed for 90 days or more at the follow-up interview. This level of re-housing is very similar to findings of longitudinal studies conducted in the U.S., which followed single adults and families (Caton et al. 2005; Stojanovic et al. 1999; Zlotnick et al. 1999). Despite the high proportion of participants who were housed at follow-up, many experienced housing instability over the course of the study based on the proportion that had moved more than once (88%). This level of housing instability among formerly homeless individuals is also consistent with previous

research findings (Caton et al. 2005; Stojanovic et al. 1999; Zlotnick et al. 1999).

A comparison of the housing outcomes among the classes found the class of individuals with substance abuse problems encountering the greatest difficulty in exiting homelessness and achieving housing stability. However, they only showed significant differences with the class of individuals characterized by mental health difficulties and substance abuse problems in terms of proportion who were considered stably housed at follow-up and length of time housed at follow-up. The class of individuals with substance abuse problems also had significantly more moves than the class of individuals with complex health problems. There is previous evidence of individuals with substance abuse problems experiencing long-term housing instability (Booth et al. 2002; Johnson et al. 1997).

The relative lack of differences otherwise among the different classes particularly in comparison to the class of individuals who are higher functioning is somewhat surprising. It suggests that exiting homelessness presented the same kind of challenges for study participants regardless of their level of functioning or health-related problems. It is possible that available health and social services are serving to “level the playing field” when it comes to finding new housing. There has been significant resources injected into the mental health system in Ontario over the past decade that have led to the development of community mental health services for people with severe and persistent mental illness (Community Mental Health Evaluation Initiative 2004; Service Enhancement Evaluation Initiative Coordinating Centre 2009), the population which correspond in our study to the classes with either “Mental Health and Substance Abuse Problems” or “Complex Physical and Mental Health Problems”. Another potential explanation is that once individuals become homeless, they become marginalized to the point that they experience similar levels of housing instability. Ultimately, our findings may suggest that homelessness is predominantly a “poverty problem” rather than a health problem. In this context, the extreme poverty shared by all our participants is an equalizer when it comes to exiting homelessness and achieving housing stability.

Study Limitations

Our study has a number of limitations that should be noted. Although significant effort was undertaken to obtain a representative sample within each of the sampled demographic subgroups to ensure that the study investigated the diversity of the population, the total sample is not representative of the proportion of each subgroup making up the overall homeless population. For this reason, the proportion reported for each class in the study cannot be taken as

indicative of the proportion actually represented in the population. As well, the recruitment of participants was conducted exclusively in emergency shelters (or in a drop-in centre in the case of youth) and different findings may have emerged if the sample included non-users of emergency shelters such those homeless individuals who are living on the street or who are couch surfing.

A second limitation of the study is the level of attrition (40%) in respondents that was experienced for the follow-up interviews. The differences between follow-up participants and non-participants in the follow-up interview were in the direction of follow-up participants having poorer physical health and a greater likelihood of having had a mental health diagnosis. Finding participants with physical health difficulties for follow-up interviews may have been facilitated in the study by their lack of transience because of their health problems. In light of these differences related to health problems, it is possible that the housing trajectories of the different classes may have yielded different findings had we been able interview the full sample at follow-up.

A third limitation was the development of latent classes from a sample that is made up of both homeless youth and homeless adults. Although these two groups were categorized in classes in our study according to similar groupings of health problems, it is important to note that the reasons behind their homelessness were different with youth homelessness precipitated especially by family conflict and problems. Consequently, the role and course of health problems in the context of homelessness may also be different for the two groups. Fowler et al. (2011) identified different outcomes for youth graduating from foster care, including a subgroup who experienced chronic housing instability, mental health difficulties, and substance abuse problems.

A fourth limitation is the fact that follow-up period of 2 years is relatively short for a longitudinal study tracking persons who have housing problems. This short period of time may have contributed to the lack of differences in housing trajectories among the three classes. On the other hand, our follow-up period was of sufficient length to capture the continued housing instability experienced by our participants as evidenced by their large average number of moves over the course of the study.

Implications of Research Findings

Our findings have a number of implications for setting housing policy and developing programs that will effectively address homelessness. The fact that our results reflect four groups with different levels of problem complexity and severity suggests that a range of housing and supports are needed. For the class of individuals who are

demonstrating higher functioning, social policies addressing poverty and its deleterious effects on housing stability are suggested.

First and foremost among policy interventions that would make a difference is the development of adequate numbers of affordable housing units for those individuals most in need. Access to subsidized housing has been found to be an important predictor of whether or not homeless individuals and families are successful in achieving residential stability (Piliavin et al. 1996; Stojanovic et al. 1999; Wong et al. 1998; Zlotnick et al. 1999). Hulchanski (2002), in a report commissioned by the Canadian Policy Research Networks, recommended that 20,000–25,000 new social housing units be built per year in Canada at a cost of \$1 billion in order to address the critical and growing shortfall of units that has existed since the withdrawal of federal funding in the early 1990s.

Rent supplements are another intervention that can assist individuals who are homeless for economic reasons to access and maintain permanent housing. There is ample research evidence that rent supplements directly help individuals with a history of homelessness to achieve stability and permanency in their housing situation (e.g., Hurlburt et al. 1996; Shinn et al. 1998; Sylvestre et al. 2004). As well, a simple increase in income support benefits would assist persons who are homeless to access and maintain housing.

For the other three classes of individuals who present with significant health issues, the development of programs that combine housing with support appear to be indicated. The interventions that address economic issues are also relevant to individuals in these other classes since they too face the barrier of having incomes that are inadequate to access housing. In addition though, their profiles of health and substance use problems suggest that they will also need supports that target their health needs over and above access to housing. There is evidence that the combination of housing and services is more effective than services alone (Nelson et al. 2007).

These programs might include what is known as a “housing first strategy” which involves providing subsidized housing, either in the private market, through rent supplements, or by accessing social housing units, as well as portable intensive support in the form of case management such as Assertive Community Treatment (Tsemberis et al. 2003, 2004). Many cities throughout the United States are adopting these strategies to target individuals with severe mental illness and histories of chronic homelessness, similar to those who would fall into our “Mental Health and Substance Abuse Problems” and “Complex Physical and Mental Health Problems” classes (Pathways to Housing Inc 2005).

In summary, this study contributes new knowledge in three distinct ways. First, it demonstrates the presence of

different groups within the homeless population with specific health-related characteristics in a Canadian context. Second, it confirms similar groupings as in previous research using latent class analysis, an analytic technique for categorizing distinct populations that is superior to cluster analysis. Third, by profiling classes within the homeless population and examining their housing trajectories prospectively, our findings contribute new information with implications for program and policy development.

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