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Long-Term Care Trajectories in Canadian Context: Patterns and Predictors of Publicly-funded Care

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Authors' Contributions

M.J. Penning planned the study, supervised the data analysis, wrote and revised the paper. D. Cloutier and S. MacDonald helped plan the study and revise the manuscript. K. Nuernberger performed statistical analyses and contributed to revising the paper. D. Taylor facilitated access to the data and advised on regional health policies.

Abstract

***Objectives*.** Drawing on a structural life course perspective (LCP), we examined the most common trajectories experienced by older long-term care (LTC - home and community-based care, assisted living, and nursing home care) recipients. The overall sequencing of care transitions was considered along with the role of social structural location, social and economic resources, and health factors in influencing them.

***Methods*.** Latent class and latent transition analyses were conducted using administrative data obtained over a 4-year period for clients aged 65 and over (*n*=2,951) admitted into publicly-funded LTC in one Canadian health region.

***Results*.** Four main LTC trajectories were identified within which a wider range of more specific or secondary sub-trajectories were embedded. These were shaped by social structural factors (age, gender, rural-urban residence), social and economic resources (marital status, income, payment for services), and health factors (chronic conditions, functional and cognitive impairment and decline, problematic behaviors).

***Discussion*.** Our findings support the utility of a structural LCP for understanding LTC trajectories in later life. In doing so, they also reveal avenues for enhancing equitable access to care and the need for options that would increase continuity and minimize unnecessary, untimely or undesirable transitions.

Key Words: latent class analysis, latent transition analysis, long-term care trajectories, structural life course perspective

Introduction

As populations age, demand for formal long-term care (LTC) services increases. LTC is frequently conceptualized in contrast to acute care, as care that is provided over an extended period of time to individuals whose capacity for self-care is restricted as a result of chronic physical, mental, or other disabilities and limitations. Formal LTC is typically provided through home and community-based services, assisted living environments, or nursing home facilities (Colombo et al., 2011). However, within current policy contexts, the term tends to refer to services provided to those with LTC needs (e.g., see OECD/European Commission, 2013). As a result, such care can in fact be short-term or intermittent as well as long-term in nature and can include an array of health services (Feder, Komisar, & Niefeld, 2000).

Insofar as LTC can incorporate multiple services delivered over varying periods of time, concern arises with regard to the nature, extent and implications of transitions from one form of care to another. What becomes problematic is ensuring that services included within the LTC trajectory are integrated and transitions between them as seamless as possible. Care transitions are widely noted to be common occurrences, with older adults considered especially vulnerable to poor transitions given their often complex care needs and likelihood of receiving care in multiple settings (Dilworth-Anderson, Hilliard, Williams & Palmer, 2011).

To date, however, research examining LTC transitions and trajectories is limited. Studies tend to focus on one type of care in isolation from others and at a given point in time. Existing longitudinal studies typically focus on single transitions (e.g., acute hospital care to some form of LTC or the reverse – see Goodwin, Howrey, Zhang, & Kuo, 2011; Menec, Nowicki, Blandford, & Veselyuk, 2009). Fewer studies address trajectories in late life care that involve multiple transitions, particularly across LTC services. As well, continuities and discontinuities in care are

seldom examined, betraying the assumption that once in care, older adults generally remain where they are or proceed from one form of LTC to another without interruption.

This study addressed gaps in our understanding of the patterns and determinants of LTC trajectories. Drawing on a structural life course perspective, we focused on the nature and social distribution of movements through LTC. Specifically, we examined the extent to which individuals' social structural location (indexed by age, gender, and rural-urban residence) and social and economic resources associated with it (e.g., marital status, living arrangements, education and income) influenced older adults' formal LTC trajectories both directly and indirectly, through health status inequalities.

Background in Theory and Research

Gerontological attention to the dynamic nature of health and health care can be traced to a life course perspective emphasizing the complex and diverse transitions and trajectories occurring in the lives of individuals and social groups. Trajectories are seen as "embedded in and shaped by the historical times and places" experienced over the life course (Elder, 1998, p. 3). This includes the macrostructural (social, political, economic) and temporally proximate contextual forces that create opportunities and barriers (Dannefer, 2012). These tend to be embodied in individual level social status indicators such as age, leading to inequalities in social and economic resources that can be said to generate diverse trajectories, including those related to health and LTC.

To our knowledge, a structural LCP has yet to be drawn upon to frame an analysis of LTC trajectories. Yet, researchers have noted the variability of individuals' pathways through the LTC system (e.g., Dilworth-Anderson et al., 2011). For example, Uyeno and Hollander (2001)

focused on 10-year patterns of movement through the continuing care system for a cohort of Canadian clients. They expected to find four to six common trajectories and a progression through increasingly intense levels of care. Instead, they found a variety of care trajectories with most having only a small proportion of clients.

Given the limited attention directed to identifying trajectories in late life care, it is not surprising that the role of social structural and other factors in influencing them also remains unclear. With regard to transitions into home care, older age, lack of a partner or of informal care and poor/declining health status are among the factors consistently reported as influential, with the differential effects of such factors on publicly- and privately-paid services also noted (Geerlings, Pot, Twisk & Deeg, 2005). Some of the same factors appear to be related to transitions into publicly-subsidized AL in Canada (McGrail et al., 2013). However, research conducted in the United States (US) that includes privately-paid AL reports that residents also tend to be female, White, more educated, and affluent (Hernandez & Newcomer, 2007; Spillman, Liu, & McGilliard, 2002), suggesting that such factors may also be influential in other similar contexts. Many of the same factors appear important with regard to transitions into nursing home care in the US (Gaugler, Duval, Anderson, & Kane, 2007; Miller & Weissert, 2000) and other developed countries (Luppa et al., 2010). This is also the case with regard to transitions from AL to nursing home care (Maxwell et al., 2013), although race, education, and income may be more relevant in some contexts than others (Hernandez & Newcomer, 2007; Spillman et al., 2002).

However, knowing the factors that are associated with specific transitions may tell us little about how they influence the broader trajectories within which various types of care are received. To date, however, research examining multiple transitions has tended to focus on the

number, rather than type of LTC transitions involved as an outcome (e.g., Sato, Shaffer, Arbaje, & Zuckerman, 2011).

The Current Study

The preceding review points to a need for longitudinal research on LTC trajectories in later life and the factors that influence them. A structural LCP provides a useful theoretical framework for analyzing the impact of age-related social structural processes on diverse outcomes, including LTC. Accordingly, we conceptualize LTC trajectories as being among the multiple social pathways through which many individuals and particularly, older adults as a social group, are likely to pass. These pathways are embedded in and will reflect macro- and meso-level social structural and contextual factors, including the policy context within which they are situated, the socially structured inequalities that attend location within particular social groups, the opportunities and barriers that emanate from these structural forces, and the health-related risks that they impose.

We addressed two research questions with an overall objective of contributing to theoretical and empirical understanding of care trajectories in later life. First, what are the main care trajectories experienced by older adults transitioning through the formal LTC system? Second, what roles do social structural location, social and economic resources and health factors play in influencing formal LTC trajectories? Addressing these gaps in the literature should also provide direction to policy and practice designed to address inequalities and enhance the quality of late life care.

The Canadian LTC Context

Our analyses were embedded in a Canadian LTC policy and service delivery context offering a mix of universal and means-tested benefits (see Colombo et al., 2011).[1] Across the country, LTC is delivered by governmental and non-governmental for-profit and not-for-profit providers, often on both a publicly-subsidized and private pay basis. In British Columbia (BC), for example, public home and community-based services include direct care (DC - home nursing, occupational therapy [OT], physiotherapy [PT], social work, nutritional services) and home support/home care (HC - assistance with mobility, nutrition, lifts/transfers, bathing, grooming/toileting and cueing) services and are supplemented by assisted living (AL), nursing home (RC) and other services (McGrail et al., 2008). For those deemed eligible, there is no cost for DC services delivered by public employees. In contrast, HC services require that care recipients, excluding those with low incomes, pay a daily rate based on income for services delivered by private agencies. Assistance with housekeeping and other instrumental activities is not generally available through the public system. AL and RC are available on both a publicly-subsidized and private-pay basis in fully-private, fully-public and mixed buildings, with recipients once again assessed a monthly rate based on income.

Methods

Data and Sample

We drew on administrative data collected by the Fraser Health Authority (FHA), one of five geographically-defined public sector organizations responsible for planning and delivering health services in BC, Canada. Data sources included the *Resident Assessment Instrument-Minimum Data Sets* for *Residential Care* (RAI-MDS 2.0) and *Home/Community Care* (RAI-HC), Canadian versions (Hirdes, Mitchell, Maxwell & White, 2011). Both include comprehensive assessments of the clinical and functional characteristics of clients and are

designed to be completed upon admission to care and every three (RAI-MDS) to twelve (RAI-HC) months thereafter.

Our original study cohort included all clients aged 65+ as of January 1, 2008 who received publicly-subsidized home and community-based care (HCBC - home support, day programs, respite care, etc.), AL, or long-term RC, with an initial service start in the 2008 calendar year (n=3,205). Clients who began receiving services earlier were not included. Clients who received DC services in 2008 and who concurrently or subsequently received HC, AL and/or RC services were also included. Client service use was tracked over a four year period (January 1, 2008 - December 31, 2011). Only those with valid data on service use and all covariates were included in the final analyses (n=2,951).[2]

Measures

To measure health care service use, we relied on service records indicating start and end dates for the receipt of various HC, DC, AL and RC services, including multiple entries and exits from each. Although home care often encompasses both home support services and DC services provided in the home environment (Health Canada, 2014), in BC, they are considered distinct services within HCBC. Consequently, they were analysed separately. AL refers to publicly-subsidized housing in which some assistance with activities of daily living is provided. Gaps in service were defined as instances where no publicly-subsidized LTC services were received for 43+ days following an episode of care.

We also included social status, socio-economic and health factors in the analyses. Age was a continuous measure, assessed in years. Gender was coded as a dummy variable. Rural-urban residency was determined using postal code information geocoded into one of three categories: rural, urban influenced (suburban) and urban core. Whether the care recipient was

married, lived alone at the start of service, and had a legal guardian responsible for decision-making regarding their care were also assessed.

Socio-economic covariates included education, income status and responsibility for payment. To assess education, we contrasted those who completed high school or more with those who did not. Whether or not the care recipient received the Guaranteed Income Supplement (GIS) paid to older adults with very low incomes served as an indication of economic status. To assess responsibility for payment, we dichotomized care recipients whose care included private payment versus those whose care did not.

Health status was assessed using multiple indicators. These included the total number of chronic conditions (from 18 conditions including stroke, hypertension, arthritis, cancer, diabetes, etc.). Activity limitations were assessed using the MDS Activities of Daily Living (ADL) Self-Performance Hierarchy Scale (Morris, Fries & Morris, 1999), which takes into account both the level of dependence (six categories ranging from independent to totally dependent) and specific activities (personal hygiene, toileting, locomotion, and eating). Scores ranged from 0 to 6, with higher scores indicating greater need for assistance with ADLs ($\alpha = .86$). Incontinence was measured based on the frequency of bladder and bowel incontinence during the past week or two. Scores ranged from 0 (no incontinence) to 8 (bladder and bowel incontinence all/most of the time). Risk of falls was a clinical assessment of the client as being at: (0) no/low risk, (1) medium risk, or (2) high risk of future falls.

We measured depression using the MDS Depression Rating Scale (DRS, Burrows et al., 2000). Based on 7 items, possible scores ranged from 0 to 14, with higher values indicating more numerous and/or frequent symptoms ($\alpha = .75$). Cognitive functioning was assessed using the MDS Cognitive Performance Scale (Morris et al., 1994). Possible scores ranged from 0 (intact)

to 6 (very severe impairment) ($\alpha = .74$). Finally problematic behavior was assessed based on the total number of responses to items reflecting wandering, verbal abuse, physical abuse, disruptive behavior, and resisting care. Possible scores ranged from 0 to 5, with higher scores indicative of more problematic behaviors.

We also included variables capturing changes in health (ADL, cognitive performance, incontinence) over time. Other health status indicators showed minimal change and thus were not included. Individual annual rates of change were computed using all measures of these indicators across all time points. Final values represent individual slopes and distinguish those who experienced more rapid decline from those with more moderate change or even improvement.

Statistical Models

Latent class analyses (LCA) were used to analyze underlying service use patterns among LTC clients (Asparouhov & Muthén, 2014). Next, Latent Transition Analyses (LTA) assessed transition probabilities between groups over time. The final latent transition pattern describing the services used over time by each individual was based on conditional probabilities defined by all possible groups over all time points. Mortality was included as an absorbing state to avoid attrition biases). The LTA model involved a three-step procedure, considered appropriate for its ability to assess the structural LCP. Latent class composition was estimated prior to the inclusion of covariates, ensuring that the structure of the categorical latent class outcome variable was not influenced by them. The final model incorporated covariates at step three, with variables entered sequentially in a series of nested models (i.e., social location variables entered in model 1, social and economic resources in model 2, baseline health status variables in model 3, and changes in health status in model 4). In the final model, all covariates were centred to the mean. MPlus version 7.2 was used for the analyses.

Results

In 2008, most of those in the sample began their LTC trajectories by using HC or DC services (see Table 1). Over the four-year study period, 71.4% used HC, 54.8% used DC, 9.4% used AL, and 53.8% used RC. Just under one-third (30.7%) used only one type of LTC during this period. In addition, 38.0% of all clients experienced at least one gap in care following entry; the number of gaps experienced ranged from 0 to 5, with most experiencing no gaps (62.0%) or one gap (28.9%) in care. One-third (33.6%) of those sampled died during the study period.

Based on the services used as well as gaps experienced over the four-year period, 345 distinct service patterns were evident. The most common were: RC only (15.1%), HC to RC (7.9%), HC only (6.5%), HC to DC (5.0%), and DC to HC (4.6%). However, LCA and LTA analyses identified four parallel latent LTC categories (see Supplementary Table 1 and Figure 1):

1) Continuous Home and Community Care (C-HCC) - defined by entry into and a high probability of HC use each year. The likelihood of 1+ gaps in care was low across all time points. Those in this class were moderately likely to have received DC services whereas the likelihood of AL and RC remained relatively low across all years.

2) Intermittent Home and Community Care (I-HCC) - characterized by the receipt of DC in 2008 which then decreased considerably over time. The likelihood of 1+ gaps in care was also high and accompanied by a low to moderate probability of HC and/or RC services in each year following admission. The probability of AL services was negligible.

3) Assisted Living (AL) - defined by a high probability of receiving AL services combined with a low to moderate probability of HC and/or DC services prior to or concurrently with AL; both decreased steadily over time. The probability of RC, although low, increased over time.

4) Nursing Home/Residential Care (RC) - defined by a high probability of RC across all years with a low probability of either HC or DC in the first year (i.e., for a relatively short period of time prior to RC entry).

In the first two years of LTC, the C-HCC group had the highest probability of membership (48.8% in 2008 and 38.6% in 2009 - see Supplementary Figure 2). However, by 2011, only 20.4% were in this group. The I-HCC group began with 19.2% of all clients which decreased to 16.0% by 2011. The AL group began with the smallest proportion of LTC clients (4.7%) but participation remained relatively stable over time. The RC group began with 27.3% of all clients in 2008 and by 2010, had the highest proportion of clients at 31.3%.

Table 2 reports transition probabilities between latent categories for each consecutive annual period. Based on probabilities estimated using model 4, among those in the C-HCC group in 2008, the probability of remaining in this group in 2009 was 74.5%. For those who made a transition, the most likely move was to I-HCC. From 2009 to 2010, the likelihood of remaining in the C-HCC group decreased to 49.8%, with the most likely transitions involving RC and death. However, among those in the C-HCC group in 2010, the likelihood of remaining there in 2011 increased to 76.8%, with shifts to I-HCC and mortality also apparent. Similarly, the majority of those in the I-HCC group were likely to remain in the same category from 2008 to 2009. The most common transition was to C-HCC, with transitions to AL or RC unlikely during this period. Somewhat fewer clients who were in the I-HCC category in 2009 were also likely to be in this category in 2010; the remainder likely transitioned to C-HCC or RC. However, by 2010, almost all were still in this group in 2011; those who were not likely died. The AL group was the most stable with 96.3% of clients in this group in 2008 expected to remain in place through 2009. Similarly, 82.4% of AL clients in 2009 were likely to be receiving AL in 2010

followed by 77.4% in 2011. The remainder likely died or transitioned into RC. Finally, of those in the RC group in 2008, the majority likely remained in RC in 2009, with a 16.5% probability of 1-year mortality. It was rare for individuals to transition out of RC to any other service group. Similar patterns were evident during the next two years, with mortality increasing to 22.8% to 23.8% per year.

Theoretically, 500 distinct latent trajectories were possible over the four-year study period. Empirically, however, over 80% of the sample either remained in a specific category or died without further transition over the 4-year period and thus, could be classified into one of five broad trajectories: (1) C-HCC only (25.7%); (2) RC only (25.3%); (3) I-HCC followed by C-HCC or the reverse (16.2%); (4) C-HCC followed by RC (9.1%); and (5) I-HCC only (7.7%). The sixth most frequent trajectory was AL only (3.9%).

Table 3 (and Supplementary Tables 2-4) reports the influence of social and health factors on class membership. In 2008, the year of entry into LTC, being older, male and an urban resident reduced the likelihood of receiving C-HCC compared to RC (the reference category). Older age was also negatively associated with I-HCC rather than RC whereas males were also less likely to enter LTC through AL than RC. Entering social and economic resources into the model did little to alter the impact of age or urban residence on entry route into LTC (see model 2). However, with these factors taken into account, gender was no longer significant. Instead, income and living arrangements were related: those receiving the GIS were 3.0 times more likely to enter LTC through AL and 2.1 times more likely to enter through C-HCC compared to RC. Conversely, those paying for services were less likely to enter through C-HCC than RC. Once baseline health status was included in the equation, age, low income and private payment for care remained significant but urban residence did not. In addition, however, those who were

married were more likely to enter LTC through C-HCC and I-HCC than RC. With social status and socioeconomic resources taken into account, ADL, cognitive and behavioral problems were also significantly related, with greater impairment associated with a lower likelihood of C-HCC, I-HCC or AL than RC. In contrast, those with more chronic conditions had a greater likelihood of experiencing C-HCC, I-HCC and AL than RC. Depression, incontinence and falls risk were unrelated. Finally, those who experienced subsequent declines in cognitive functioning also appeared less likely to have received I-HCC than RC in year 1.

Significant predictors of class membership in 2009 and subsequent years represent unique incremental prediction over and above immediately previous latent status. Accordingly, a smaller number of covariates emerged as predictors of class membership in 2009. Being older and male were predictors of mortality as compared to RC class membership in model 1. Entering social and economic resources and health status indicators into the model had limited impact on these relationships.

From 2009 to 2010, those in the C-HCC and I-HCC groups exhibited reduced stability and an increased likelihood of transition. Once again, in model 1, being older and male increased the likelihood of mortality. However, being older and male also reduced the probability of I-HCC relative to RC in year 3. Being male was also associated with a reduced likelihood of receiving AL compared to RC in that year. With the entry of social and economic resources into the model (model 2), the negative impact of older age on I-HCC remained significant as did the impact of older age and male gender on mortality. However, gender was no longer significant. Income was the only resource factor to emerge as significant, with lower income increasing the probability of C-HCC compared to RC. These factors retained their significance with the entry of baseline health status into the equation. In addition, however, poorer cognitive performance

reduced the likelihood of being in the C-HCC and I-HCC compared to RC groups in year 3. As well, those with a greater number of chronic conditions faced a greater likelihood of mortality during this time compared to those in RC. Finally, declines in ADL functioning were associated with a reduced likelihood of receiving C-HCC or I-HCC whereas increases in incontinence reduced the likelihood of AL rather than RC in year 3.

In 2011, age and gender remained significant, with older individuals and men once again facing greater mortality than those in the reference category. This was the case with and without other social status, socio-economic and health factors taken into account. The only other factor to emerge as significant was declining ADL function, which was associated with increased probability of mortality relative to RC in year 4.

Discussion

This study drew on a structural LCP and longitudinal data to identify the main care trajectories experienced by older adults transitioning through the publicly-supported LTC system as well as to assess the roles of social status, social and economic resources, and health factors in influencing them. In addressing these questions, several important findings emerged.

First, although several hundred care trajectories could initially be identified when examining transitions involving HC, DC, AL, RC as well as GAPs in service, these appeared to be embedded within four broader latent LTC categories (i.e., C-HCC, I-HCC, AL, and RC). Over 50% of those studied could be classified into C-HCC or RC (with or without mortality). This was followed in prevalence by movements between C-HCC and I-HCC, movements from C-HCC to RC, I-HCC only, and continuous AL. These findings provide little indication that LTC generally begins with HC, proceeds to RC, and ends with mortality. However, neither do they reveal a very large number of complex trajectories. Instead, they suggest that it may be

useful to conceptualize LTC as involving a limited number of general LTC trajectories within which a wider range of more specific or secondary sub-trajectories tend to be embedded.

Secondly, HCBC trajectories differed considerably when comparing those receiving HC and DC services. Those whose trajectories began with HC were apt to continue receiving these services over succeeding years, sometimes receiving DC services as well or transitioning from HC to DC or other services. Conversely, those admitted through DC were more likely to experience intermittent care before receiving HC (with or without DC as well) or RC. Overall, such findings would seem to support a view of these as two different HCBC trajectories – one involving longer-term HC services (with or without DC services) and the other involving short-term DC services as a pathway into more continuous HC or RC. This is important given the tendency to conceptualize home care as a single form of care.

Third, a significant minority of those studied, all of whom had been admitted to some form of LTC, subsequently experienced one or more periods (of 43+ days) during which they received no services. Thus, once begun, LTC is not necessarily long-term and continuous. Although DC recipients were the most likely to experience gaps in care, these were evident in conjunction with other services as well. It may be that this reflects situations where LTC needs were no longer evident or were being met through other sources (informal and/or formal). Indeed, clients were most likely to experience gaps in care earlier in their trajectories, when needs may have been lower and alternative resources more readily available. Alternatively, perhaps HC services are increasingly being used on a short-term or intermittent basis to address post-hospital or palliative care needs (McGrail et al., 2008). In addition, private payment for short- but not long-term HC services tends to be waived, perhaps generating increased use. For

others, particularly those in RC facilities, gaps in care may reflect time spent in hospital or other care settings. There is a need for research to examine these and other possible explanations.

Fourth, people entered publicly-subsidized AL directly or after a brief period of HC or DC. Thereafter, few people transitioned into AL. However, once in AL, clients tended to remain there, with a small proportion making the move to RC. AL clients were more likely to transition to mortality than to RC. This offers limited support to suggestions that transitions from AL to other care settings are likely as health needs increase (Stone & Reinhard, 2007) and suggests that the relatively small number of clients who accessed AL were generally able to 'age in place' (Spillman et al., 2002). However, the fact that our findings were based on a small sample of individuals in publicly-subsidized AL tempers such conclusions.

Fifth, a significant proportion of older adults entered LTC by moving directly into RC, most remaining there until they died. This pattern appears to differ from that evident in the US, where older adults more often use such facilities on a short-term basis (Weissert, Cready & Pawelak, 2005). This likely reflects differences in LTC systems and their financing, particularly with regard to the non-poor.[3] Findings such as these speak to the need for contextually-based understanding of LTC trajectories. Both the number and type of trajectories are likely to vary depending on the health and LTC policies and practices in place in a given setting at a particular point in time.

Finally, our findings revealed considerable empirical support for the utility of a structural LCP. For example, we found older clients less likely to enter LTC through HCBC and more likely to enter through RC, a finding not attributable to age-related differences in social and economic resources or health status. Although age was less consequential with regard to subsequent transitions, when it did emerge, the pattern was similar. Findings of this nature are

not unique: age routinely emerges as a predictor of LTC service use and RC transitions (e.g., see Miller & Weissert, 2000). However, whereas age tends to be conceptualized as a factor that predisposes one to use or not use health services (e.g., Andersen, 1995), a structural LCP considers age an indicator of location within an age-stratified social structure. Viewed from this perspective, those in advanced old age do not appear to be considered appropriate candidates for HCBC regardless of social and economic resources or health status. Instead, they appear more likely to be funneled into institutional care.

Social and economic resources also influenced LTC trajectories. For example, marital status appeared influential primarily at the point of entry, both directly and indirectly through its association with health status. Income and payment for services also had an impact, with those having lower incomes more likely to experience C-HCC or AL than RC at the outset and, in some instances, to transition into C-HCC rather than RC later on. Again, these differences were not attributable to differences in health or other factors. Instead, they appear to reflect the service context studied here. As noted, only those with low incomes were eligible for publicly-subsidized HC and AL, whereas this was not the case for DC or RC services. Moreover, private contribution to the cost of all services other than DC was required of all those assessed as being able to contribute.

Health status also influenced LTC trajectories: those with greater cognitive and ADL impairment as well as more problematic behavior were less likely to experience C-HCC, I-HCC or AL than RC in their first year. They and those with declines in functioning also were less likely to transition into these categories than RC in subsequent years. These findings are consistent with previous research (Geerlings et al., 2005; Miller & Weissert, 2000), and often lead to the conclusion that health needs tend to be more important than social location or socio-

economic resources in influencing service use. However, our findings suggest that health factors mediate relationships between social structural factors and LTC pathways. Also, it is particular kinds of health needs that lead to particular patterns of service use over time.

Several factors should be considered when interpreting these findings. First, the study was carried out using data on older adults who received publicly-subsidized services in a specific health region in Canada. Their experiences will necessarily differ from those relying exclusively on privately-provided (paid, unpaid) services or living in regions with different policies and service options. Yet, private services are increasingly central components of LTC trajectories in Canada and elsewhere. The inclusion of those relying only on private resources for care would likely have generated different results, both in terms of trajectories and the factors that influence them. For example, trajectories involving AL would likely have been more prevalent and the impact of income levels quite different. Ultimately, there is a need for research that includes privately-provided forms of care within this and other contexts. Whether and how LTC trajectories in countries such as Canada (characterized by a mixed model of care providing both publicly-funded and means-tested services) differ from those evident in countries such as the US (which primarily offer means-tested safety-net schemes) remains unclear and warrants further research.

In addition, we focused on LTC trajectories over a four-year period. These might look different if assessed over a longer period or from entry to mortality. As well, we focused only on transitions between major types of LTC. Transitions involving other forms of care (e.g., informal care, hospitalizations) were not addressed. There is a need to extend our models to include other forms of care, a direction that may prove particularly important in understanding apparent gaps in care. Finally, although we included changes in health status (functional impairment, cognitive

status, incontinence) in our analyses, other factors could be assessed at baseline only (e.g., marital status, GIS eligibility) or were unavailable for all or part of the sample (e.g., informal caregivers). Subsequent analyses with different data and a more heterogeneous sample studied over a longer period of time would allow for changes in these and other factors to be more fully examined.

These and other concerns point to the need for further research. Yet, our findings also have several potentially important implications. They indicate that there is more than one LTC trajectory (at least when it comes to publicly-subsidized LTC) and that they not only include different types of care but also both continuities and discontinuities (gaps) in care. They also encompass numerous sub-trajectories. Theoretically, our findings support the utility of a structural LCP for understanding such trajectories. Increased attention to these trajectories and the multi-level contextual factors that influence them should contribute to further theoretical development. Attention to the role of intersecting inequalities (e.g., age and gender) and reciprocal effects (e.g., between socioeconomic resources and health factors) may also prove beneficial. Methodologically, our findings also point to the utility of latent transition analyses in addressing such issues.

Finally, our findings also have important implications for LTC policy and practice. Findings indicating that advanced age and being unmarried restrict access to HCBC trajectories suggest avenues for enhancing equitable access to such care. In addition, the finding that LTC is not necessarily continuous and often involves gaps in care has implications for service delivery, revealing a possible need to consider alternative forms of transitional care (e.g., Coleman & Boult, 2003). Along similar lines, evidence that it is those with greater deficits and declines in functioning following entry into care who are the most likely to be faced with transitions through

various LTC services attest to the particular vulnerability of this group. Given that older adults with complex needs who receive care in multiple settings appear to be at particular risk for negative outcomes, such findings point to the importance of options that would minimize unnecessary, untimely or undesirable transitions. This includes enhancing HCBC options for those at risk and possibly targeting transitional care resources to those undergoing such declines. Ultimately, better understanding of care trajectories and the factors that influence them should facilitate our ability to predict care needs and enhance transitions that maintain quality of life.

Footnotes

[1] Canada has a national health insurance program that provides universal coverage of acute physician and hospital services. This is not the case for LTC services. As a provincial/territorial responsibility, they decide what aspects of care will be publicly-funded and the terms of coverage. The result is variability in policies, funding levels, eligibility criteria, and user fees across the country, contributing to differences in access to various LTC services.

[2] Missing values represented 3% or less of observations for any given variable, with the exception of education (6.7%). Comparison of those included or not included in the final sample based on education revealed no significant differences.

[3] Canada does not restrict access to publicly-subsidized nursing home care to those with low incomes. In the US, in contrast, Medicaid, the primary funder of LTC, only covers the costs of care for people with low incomes and assets whereas Medicare limits coverage to short-term stays of less than 100 days following hospitalization.

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Table 1. Sample Characteristics at Baseline

Variable	*M* or % (95% CI)
Initial LTC service	
Home care (HC)	41.1 (39.3, 42.8)
Direct/home health care (DC)	37.3 (35.5, 39.0)
Assisted living (AL)	2.6 (2.1, 3.2)
Residential/nursing home care (RC)	19.0 (17.6, 20.4)
Age (in years)	81.8 (81.5, 82.0)
Gender (1 = male, 0 = female)	37.3 (35.6, 39.1)
Location	
Rural	11.7 (10.5, 12.9)
Urban influenced	36.3 (34.6, 38.0)
Urban	52.0 (50.2, 53.8)
Marital status (1 = married, 0 = not married)	37.9 (36.2, 39.7)
Living arrangements (1 = alone, 0 = with others)	38.4 (36.7, 40.2)
Legal guardian (1 = yes, 0 = no)	53.3 (51.5, 55.1)
Education (1 = high school completion or more, 0 = less)	46.9 (45.1, 48.7)
Guaranteed income supplement (1 = received, 0 = not received)	46.3 (44.5, 48.1)
Private pay (1 = yes, 0 = no)	25.4 (23.9, 27.0)
Number of chronic conditions (0 to 10)	2.9 (2.8, 3.0)
ADL impairment (0 = independent to 6 = total dependence)	1.3 (1.2, 1.3)
Incontinence (0 = no incontinence to 8 = frequent bowel and bladder incontinence)	1.6 (1.5, 1.7)
Falls risk (0 = no/low risk, 1 = medium risk, 2 = high risk)	0.7 (0.7, 0.8)
Depression (0 = low to 14 = high)	1.7 (1.6, 1.8)
Cognitive performance (0 = intact to 6 = very severe impairment)	1.8 (1.8, 1.9)
Behavioural problems (0 = low to 5 = high)	0.2 (0.2, 0.2)
Sample size	*N* = 2,951

Note: Unweighted means or percentages

Table 2. Estimated Latent Transition Probabilities by Year, 2008 – 2011

2008	2009				
	C-HCC	I-HCC	AL	RC	Mort
C-HCC	0.745	0.142	0.040	0.001	0.072
I-HCC	0.111	0.838	0.027	0.023	0.000
AL	0.000	0.013	0.963	0.000	0.024
RC	0.006	0.040	0.000	0.789	0.165
2009	2010				
	C-HCC	I-HCC	AL	RC	Mort
C-HCC	0.498	0.067	0.015	0.249	0.171
I-HCC	0.291	0.420	0.024	0.203	0.061
AL	0.000	0.009	0.824	0.069	0.098
RC	0.000	0.023	0.000	0.739	0.238
Mortality	0.000	0.000	0.000	0.000	1.000
2010	2011				
	C-HCC	I-HCC	AL	RC	Mort
C-HCC	0.767	0.113	0.001	0.006	0.112
I-HCC	0.017	0.945	0.000	0.000	0.037
AL	0.000	0.008	0.774	0.099	0.120
RC	0.001	0.013	0.000	0.758	0.228
Mortality	0.000	0.000	0.000	0.000	1.000

Note: RC = Residential/nursing home care; C-HCC = Continuous home & community-based care; I-HCC = Intermittent home and community-based care; AL = Assisted Living. Numbers represent the estimated joint probability of occupying a given latent class in two successive years. Numbers on the diagonal represent the estimated probability of being in the same latent class in two successive years (i.e., 2008 & 2009; 2009 & 2010; 2010 & 2011)

Table 3. Multinomial Logistic Regression Results: Odds ratios (ORs) and corrected p-levels for class membership compared to nursing home/residential care (reference), 2008-2011, Final model

2008 (ref = RC)	C-HCC		I-HCC		AL		Mort	
	OR	p-level	OR	p-level	OR	p-level	OR	p-level
Age	0.969	0.001	0.945	0.001	0.985	0.478	-	-
Gender	0.899	0.548	0.919	0.649	0.818	0.554	-	-
Location							-	-
Urban	0.885	0.240	1.061	0.643	1.201	0.431	-	-
Suburban	0.880	0.240	0.886	0.393	1.041	0.849	-	-
Marital status	1.442	0.032	1.523	0.034	0.928	0.849	-	-
Living arrangements	0.750	0.063	0.982	0.920	0.823	0.596	-	-
Legal guardian	0.875	0.426	0.869	0.478	1.252	0.478	-	-
Education	0.931	0.631	1.213	0.254	1.077	0.816	-	-
Guaranteed income supplement	1.855	0.001	1.093	0.643	2.460	0.001	-	-
Private pay	0.664	0.001	0.693	0.030	0.674	0.254	-	-
Chronic conditions	1.103	0.016	1.202	0.001	1.172	0.016	-	-
ADL impairment	0.628	0.001	0.733	0.001	0.465	0.001	-	-
Incontinence	0.949	0.187	0.992	0.849	0.856	0.104	-	-
Risk of falls	0.888	0.155	1.033	0.787	0.885	0.516	-	-
Depression	1.019	0.554	0.978	0.554	0.937	0.330	-	-
Cognitive performance	0.678	0.001	0.678	0.001	0.702	0.001	-	-
Behavioural problems	0.770	0.018	0.628	0.005	0.215	0.018	-	-
Change in ADL	0.803	0.554	0.989	0.970	0.726	0.622	-	-
Change in CPS	0.929	0.849	0.423	0.034	1.679	0.478	-	-

Change in incontinence	1.134	0.605	0.928	0.815	0.932	0.815	-	-

2009 (ref = RC)	C-HCC		I-HCC		AL		Mort	
	OR	p-level	OR	p-level	OR	p-level	OR	p-level
Age	1.009	0.813	0.981	0.614	1.035	0.545	1.055	0.001
Gender	1.530	0.499	1.226	0.743	0.988	0.987	1.831	0.053
Location								
Urban	0.796	0.598	0.803	0.598	0.943	0.933	0.850	0.598
Suburban	0.773	0.545	0.665	0.229	0.666	0.495	0.714	0.229
Marital status	0.694	0.598	0.972	0.981	1.137	0.933	0.893	0.813
Living arrangements	0.584	0.411	0.748	0.614	1.581	0.598	0.887	0.813
Legal guardian	1.209	0.748	1.290	0.629	0.946	0.962	1.031	0.962
Education	0.882	0.813	0.755	0.598	0.793	0.783	0.751	0.531
Guaranteed income supplement	1.530	0.531	0.784	0.678	1.536	0.598	0.947	0.933
Private pay	0.938	0.933	1.330	0.626	0.601	0.598	0.890	0.813
Chronic conditions	0.985	0.933	0.997	0.984	1.023	0.933	1.104	0.411
ADL impairment	0.829	0.411	0.805	0.276	0.600	0.100	1.169	0.276
Incontinence	0.923	0.598	0.897	0.544	1.030	0.933	0.959	0.651
Risk of falls	0.817	0.557	0.929	0.813	0.648	0.328	1.058	0.814
Depression	0.988	0.933	1.003	0.981	1.024	0.909	1.003	0.981
Cognitive performance	1.212	0.495	1.143	0.598	0.865	0.651	1.102	0.598
Behavioural problems	1.114	0.813	1.354	0.411	0.698	0.783	0.998	0.989
Change in ADL	0.332	0.229	0.240	0.053	1.606	0.743	0.759	0.670
Change in CPS	1.732	0.598	1.745	0.614	0.737	0.883	1.190	0.813
Change in incontinence	1.033	0.981	1.198	0.813	0.534	0.570	0.806	0.614

	C-HCC	I-HCC	AL	Mort

2010 (ref = RC)	OR	p-level	OR	p-level	OR	p-level	OR	p-level
Age	0.993	0.690	0.966	0.020	1.008	0.814	1.044	0.001
Gender	0.928	0.770	0.733	0.214	0.542	0.214	2.040	0.001
Location								
Urban	1.092	0.588	0.962	0.836	0.875	0.761	0.835	0.202
Suburban	0.858	0.279	0.849	0.339	1.361	0.373	1.065	0.723
Marital status	1.078	0.789	1.099	0.789	2.052	0.214	0.741	0.219
Living arrangements	0.850	0.571	0.969	0.921	1.954	0.198	0.890	0.698
Legal guardian	0.864	0.505	1.015	0.937	0.812	0.723	0.843	0.398
Education	1.094	0.723	1.194	0.505	1.099	0.837	1.064	0.788
Guaranteed income supplement	1.428	0.080	1.065	0.836	2.026	0.128	1.108	0.690
Private pay	0.908	0.723	1.091	0.788	1.066	0.921	0.759	0.214
Chronic conditions	1.080	0.198	0.998	0.975	1.090	0.597	1.191	0.001
ADL impairment	0.921	0.327	0.910	0.327	0.894	0.588	1.117	0.185
Incontinence	1.011	0.860	1.015	0.837	0.854	0.219	1.016	0.788
Risk of falls	0.853	0.193	0.804	0.103	0.837	0.588	0.933	0.618
Depression	0.984	0.723	0.996	0.930	0.967	0.723	0.961	0.320
Cognitive performance	0.799	0.001	0.837	0.098	0.828	0.373	0.935	0.505
Behavioural problems	0.686	0.053	0.678	0.080	0.298	0.240	1.011	0.930
Change in ADL	0.229	0.001	0.296	0.001	0.733	0.761	1.305	0.505
Change in CPS	0.547	0.327	0.703	0.624	0.866	0.921	0.934	0.880
Change in incontinence	0.600	0.087	0.751	0.419	0.185	0.001	0.747	0.202
2011 (ref = RC)	C-HCC		I-HCC		AL		Mort	
	OR	p-level	OR	p-level	OR	p-level	OR	p-level
Age	1.006	0.962	1.014	0.814	0.929	0.389	1.073	0.001

Gender	1.848	0.389	1.751	0.549	1.958	0.640	1.962	0.001
Location								
Urban	1.089	0.924	0.968	0.999	0.662	0.640	0.852	0.640
Suburban	1.040	0.983	1.085	0.924	1.001	0.999	1.465	0.060
Marital status	0.537	0.409	0.649	0.704	0.857	0.968	1.079	0.924
Living arrangements	0.435	0.170	1.168	0.924	0.702	0.784	0.701	0.395
Legal guardian	0.733	0.704	0.477	0.231	0.672	0.704	0.617	0.064
Education	1.306	0.704	1.334	0.704	2.264	0.389	1.320	0.418
Guaranteed income supplement	1.554	0.570	0.749	0.759	0.577	0.700	0.806	0.651
Private pay	1.336	0.767	0.895	0.932	0.555	0.640	0.839	0.704
Chronic conditions	0.933	0.784	1.011	0.999	1.141	0.800	1.096	0.389
ADL impairment	0.973	0.968	1.203	0.640	1.296	0.745	1.058	0.759
Incontinence	1.092	0.704	1.000	0.999	0.887	0.800	1.088	0.389
Risk of falls	0.918	0.920	0.984	0.999	1.958	0.501	0.904	0.704
Depression	0.962	0.800	0.977	0.924	0.957	0.924	0.998	0.999
Cognitive performance	0.933	0.920	0.904	0.800	0.882	0.920	1.003	0.999
Behavioural problems	0.914	0.924	0.927	0.962	0.022	0.080	0.993	0.999
Change in ADL	1.818	0.700	1.430	0.809	0.866	0.999	4.740	0.001
Change in CPS	0.375	0.549	0.735	0.920	0.152	0.700	0.547	0.389
Change in incontinence	0.598	0.570	1.006	0.999	0.115	0.067	0.941	0.932

Note: C-HCC = Continuous home & community-based care; I-HCC = Intermittent home and community-based care; AL = Assisted Living; RC = Residential/nursing home care; Mort = Mortality. Location is effect coded such that rural = -1. Odds ratios (OR) and corresponding p-levels represent the results of multinomial logistic regression analyses where latent group membership in each year is compared to membership in the RC group.