

# Association between Falls and Caregiving Tasks among Informal Caregivers: Canadian Community Health Survey Data

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## RÉSUMÉ

Les chutes constituent une cause de morbidité et de mortalité fréquente chez les personnes âgées. Bien que plusieurs études aient exploré les liens entre les chutes des bénéficiaires de soins plus âgés et la santé de leurs aidants, peu de recherches ont abordé les liens entre les tâches effectuées par les aidants âgés et leurs propres chutes. La présente étude a évalué les rapports entre, d'une part, les chutes des aidants et, d'autre part, la fréquence et le type de tâches assumées par des aidants naturels plus âgés. Les données, tirées de l'Enquête sur la santé des collectivités canadiennes - Vieillesse en santé (ESCC 2008-2009; N=2934), ont été examinées à l'aide d'analyses descriptives et de régressions logistiques. Les fréquences de prestation de soins plus élevées étaient positivement associées, chez les aidants, avec un plus grand nombre de chutes subies au cours de la dernière année, tandis que les aidants effectuant des tâches ménagères rapportaient moins de chutes. Ces résultats indiquent qu'il pourrait y avoir une relation entre des facteurs associés aux soins fournis et les chutes, chez les aidants plus âgés. De plus amples recherches, utilisant des données longitudinales et expérimentales, sont nécessaires pour mieux comprendre les liens entre les tâches assumées par l'aidant âgé et ses risques de chute.

## ABSTRACT

Falls are a common cause of morbidity and mortality in older adults. While research has explored the relationship between older care recipient falls and caregiver health, there has been little investigation of the relationship between caregiving tasks and falls in older caregivers. This study assessed associations between falls and caregiving frequency and type of caregiving tasks among informal older caregivers. Data from the Canadian Community Health Survey on Healthy Aging (Public Use Microdata File 2008–2009) ( $n = 2,934$ ) were examined, using descriptive and logistic regression analyses. Higher frequency of caregiving was positively associated with falls, although those who performed household chores were less likely to report falling in the past year. Results suggest there may be an association between factors related to caregiving and falls in older caregivers. More research using longitudinal and experimental data is needed to better understand the relationship between caregiving tasks and falls in older caregivers.

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## Background

Falls are a serious cause of morbidity and premature institutionalization in adults aged 65 years and older (DiGrande et al., 2010; Rubenstein, 2006;

Tinetti & Williams, 1997). Estimates have suggested that as many as one third of older, community-dwelling adults fall every year (O'Loughlin, Robitaille, Boivin, & Suissa, 1993). These estimates increase with age, with

around half of seniors aged 75 and older having reported a fall (Gray, 2004). Falls are the leading cause of injury-related disabilities and deaths in non-institutionalized Canadian seniors (41% in 2006) (Butler-Jones, 2010). Up to one per cent of all admissions to Canadian emergency rooms are attributed to falls, but it is thought that falls are the contributing factor in double that number (Gray, 2004). Forty per cent of nursing home admissions occur as a result of falls (Scott, Peck, & Kendall, 2004). Given their frequency, fall-related injuries also have a large economic cost. The Canadian economy shoulders \$2.8 billion in costs attributable to falls in those 65 and older (Scott et al., 2004). Even when falls occur without physical injury, older adults may develop a *fear of falling*, an anxiety-related condition that causes older adults to restrict physical activity to avoid falling, paradoxically making them more likely to fall again in the future (Rubenstein, 2006). Because of the prevalence and impact of falls on seniors, as well as the increase in the number of older adults, fall prevention is one of five key Canadian public health goals for seniors (Edwards & Mawani, 2006); the others are social connectedness, physical activity, healthy eating, and tobacco control.

Falls can also impede older adults from contributing in other ways to “the richness of Canadian life and the economy” (Edwards & Mawani, 2006, p. 6). In addition to enriching their communities with their experience, knowledge, and support, many older Canadians also provide hands-on informal care, such as assistance with activities of daily living or transportation, for spouses, children, grandchildren, friends, and neighbors. By some estimates, as many as 69 per cent of older Canadians have been caregivers at one time or another (Edwards & Mawani, 2006). When seniors provide care for other older adults, it also increases the ability of frail individuals to remain independent while reducing burdens on the health care system as a whole (Kramer, 1997).

Caregiving can provide rewards, such as enhanced self-worth, personal satisfaction, and closer relationships with care recipients (Kramer, 1997; Turner & Findlay, 2012), but some studies suggest that caregivers may also be exposed to increased burdens as a result of their activities. The biological and physiological changes associated with age, combined with the stress and physical demands of caregiving, may put these older caregivers at increased risk for health problems (Schulz & Beach, 1999). Moreover, caregivers who perceive high caregiving demands are more likely to experience negative health outcomes (Schulz & Beach, 1999); 32 per cent of caregivers who contribute more than 21 hours of care per week are four times as likely as those who provide fewer than 10 hours to report experiencing distress as a result of their role (Canadian Institute for

Health Information, 2011). Certain forms of caregiving duties, such as those perceived to be more demanding and/or difficult than others (e.g., providing more activities of daily living) (Park et al., 2013), result in greater risk of serious illness (Shaw et al., 1997).

Given the burden imposed by falls and the importance of older caregivers to society, it is surprising that there has been no research investigating whether certain types of caregiving may be independently associated with falling. Researchers have extensively studied other potential risk factors for falling, such as medication side effects, mobility and balance issues, poor vision, muscle weakness, older age, underweight, incontinence, chronic health conditions, depression, and environmental hazards (DiGrande et al., 2010; Kuzuya et al., 2006). In this study, our objective was to identify whether an association exists between types of caregiving duties and falls among informal caregivers aged 65 and older. We attempted to determine whether, among older caregivers, certain duties may be associated with falls – especially duties frequently performed and/or requiring different types of physical exertion. A better understanding of the relationship between caregiving duties and falls is important, as identifying and modifying even a few factors related to falls can help in their prevention.

## Methods

### Data

This analysis is based on Statistics Canada’s Canadian Community Health Survey (Statistics Canada, 2010), which contains anonymized data collected in the 2008–2009 Canadian Community Health Survey – Healthy Aging (PUMF, version March 2011). We prepared all computations on these microdata, and the responsibility for the use and interpretation of these data is entirely ours. The CCHS-Healthy Aging is a cross-sectional, population-based study conducted from December 1, 2008 to November 30, 2009 to collect data on the health status of community-dwelling adults aged 45 and older. CCHS-Healthy Aging included a module on falls that was administered to a representative sample of respondents aged 65 and older. There was an overall household-level response rate of 80.8 per cent, a personal-level response rate of 92.1 per cent, and a combined (household and personal) response rate of 74.4 per cent. A total of 30,865 respondents were represented in the final study sample. A complete description of the full study is available elsewhere (Statistics Canada, 2010).

Fall data were collected only from participants aged 65 and older. Of eligible participants, 16,369 responded to the question “in the past 12 months, did you have any falls?” Any participant who reported either no falls (here categorized as “no falls”) or no serious injury due to a fall, injury requiring medical attention, and injury

requiring medical attention and hospitalization (combined into a new variable, “falls”) were included. Of these participants, 15,804 reported on caregiver status; 5,465 indicated that they had provided assistance to a care recipient in the previous 12 months. To ensure that caregivers had begun caregiving duties prior to report of a fall, we further limited this sample to those who had been providing assistance to their care recipient for more than one year. Thus, the final sample for this study was limited to 2,934 participants who provided informal assistance to another person for one year or more and responded to the question about whether they had had a fall in the past 12 months.

### Measures

**Outcome (Falls).** Participants were asked whether they had had a fall in the past 12 months. Fall variables were dichotomized. Participants who reported any fall (“fallers”) were coded as 1.

**Independent variables.** The primary independent variables were related to specific caregiving duties – for example, providing assistance with personal care, medical care, care management, household activities (housework, home maintenance, and outdoor work), transportation, and providing meals.

Co-variables we selected were based on previously identified fall risk factors (DiGrande et al., 2010; Ganz, Bao, Shekelle, & Rubenstein, 2007) and common sociodemographic categories. In addition, we included factors related to caregiving, such as frequency of providing care (daily or not), to determine whether these factors were also associated with falls. Scaled responses on the self-perceived health question were analysed as a binary variable with (fair/poor) equaling poor and (good to excellent) equaling good. The range of variables included in the analyses was limited by the nature of the available data.

### Analysis

A multi-stage, stratified cluster sampling design was used to select CCHS participants. To adjust for this complex design, we weighted all tests according to data supplied by Statistics Canada.

Differences between informal caregivers aged 65 and older who had no reported fall and those who had fallen (fallers) during the previous 12 months were tested for statistical significance using the  $\chi^2$  test (Table 1). The association of specific caregiving duties with the occurrence of at least one fall in the previous 12 months was estimated in weighted logistic regression models for which we calculated unadjusted and adjusted odds ratios with 95 per cent confidence intervals (Table 2). Model 2 controlled for all co-variables in Table 1. Only participants

**Table 1: Selected characteristics of fallers and non-fallers among informal caregivers age 65 and older (weighted)**

Selected Characteristics	No Falls	Falls	<i>p</i>
Total	2,389	545	
Gender: male	47.80%	46.33%	.6750
Income <sup>a</sup>			.0651
Under \$20,000	23.80%	31.47%	
\$20,000–\$39,999	76.20%	68.53%	
Education: High school and above	65.71%	72.31%	.0328*
Age: years			.8300
65–74	38.87%	38.11%	
75 and older	61.13%	61.89%	
White race	93.64%	94.71%	.5632
Married	72.82%	66.18%	.0189*
Visual problems: uncorrected	1.64%	2.68%	.1918
Mobility problems	7.51%	13.89%	.0005***
At least one chronic condition (CC)	91.75%	94.94%	.0618
Poor self-perceived health	50.97%	46.74%	.2269
Frequency of caregiving (daily)	49.46%	55.49%	.0400*

\**p* ≤ .05; \*\**p* ≤ .01; \*\*\**p* ≤ .001.

<sup>a</sup> No participants in the selected sample reported income over \$40,000.

with complete data for all variables were included in the regression analyses. For all analyses, a *p*-value of .05 or less was considered significant. Statistical analyses were performed with SAS version 9.3 (SAS Institute).

### Results

A total of 2,934 older adults reported caregiving activities lasting longer than one year, and of these, 545 reported having a fall within the past 12 months. There were no significant differences between those who had fallen and those who had not on key sociodemographic measures, such as income, gender, age and race, or health-related measures, including uncorrected visual problems, self-reported health status, and having one or more chronic conditions (Table 1). There were significant differences between fallers and non-fallers with respect to frequency of caregiving. Significant differences were also found with respect to education, marital status and mobility problems.

We undertook logistic regression analyses for each key independent variable separately and found no significant associations between caregiving duties and having fallen (analyses not shown). The unadjusted multivariate logistic regression model with all of the key independent variables (Table 2, Model 1) detected no significant associations with respect to most caregiver duties, with the exception of providing help with household activities, which was associated with lower odds of a caregiver falling in the previous 12 months (*OR* = 0.700; 95% *CI* = 0.519 to 0.943). After adjusting for co-variables in Model 2 (Table 2), performing household activities was still significantly associated with

**Table 2: Association of factors related to caregiving on falls among informal caregivers 65 and older (weighted logistic regression results)**

Variables	Dependent Variable: Fall in the past 12 months (yes = 1, no = 0); Odds ratio (95% CI)	
	Model 1 (unadjusted for co-variables)	Model 2 (adjusted)
<b>Type of assistance to care recipient</b>		
Provide personal care	0.849 (0.578 to 1.247)	0.985 (0.552 to 1.759)
Provide medical care	1.444 (0.935 to 2.229)	1.052 (0.548 to 2.018)
Provide care management	0.925 (0.654 to 1.309)	0.750 (0.407 to 1.384)
Provide housework, home maintenance, and outdoor work	0.700 (0.519 to 0.943)*	0.482 (0.266 to 0.873)*
Provide transportation	1.008 (0.743 to 1.368)	1.683 (0.905 to 3.130)
Provide meals	1.166 (0.837 to 1.642)	1.809 (1.003 to 3.264)
<b>Co-variables</b>		
<i>Background variables</i>		
White race		0.965 (0.300 to 3.101)
Male gender		0.874 (0.478 to 1.598)
Older age (75 and older)		1.367 (0.796 to 2.347)
Education – high school and above		1.885 (1.163 to 3.056)**
Income <sup>a</sup> (\$20,000–39,999)		0.694 (0.392 to 1.229)
Married		0.483 (0.265 to 0.879)*
<i>Other caregiving variables</i>		
Frequency of caregiving (daily)		2.091 (1.135 to 3.852)*
<i>Health related variables</i>		
Visual problems: uncorrected		1.251 (0.291 to 5.369)
Mobility problems		2.281 (1.193 to 4.363)*
At least one chronic condition (CC)		23.495 (4.156 to 132.807)*** <sup>b</sup>
Self-perceived health (good)		1.375 (0.785 to 2.411)

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ .

<sup>a</sup> No participants in the selected sample reported income over \$40,000.

<sup>b</sup> Wide confidence interval; result should be interpreted with caution.

lower odds of having fallen ( $OR = 0.482$ ; 95%  $CI = 0.266$  to  $0.873$ ), as was frequency of caregiving (daily) ( $OR = 2.091$ ; 95%  $CI = 1.135$  to  $3.852$ ). Higher education also remained significantly associated with higher odds of having fallen ( $OR = 1.885$ ; 95%  $CI = 1.163$  to  $3.056$ ). As might be expected, among the health-related co-variables, mobility problems and one or more chronic conditions<sup>1</sup> remained significantly associated with increased odds of an older caregiver having reported a fall in the past 12 months.

## Discussion

This study assessed the relationship between types of caregiving duties and falls among community-dwelling caregivers aged 65 and older. In the bivariate analysis (Table 1), there was a significant difference ( $p \leq .05$ ) between fallers and non-fallers on a measure of caregiving frequency, with more frequent (daily) caregiving associated with higher odds of falling; this association continued in the fully adjusted model (Model 2).

In both the unadjusted and adjusted logistic regression models, there were no statistically significant associations detected between type of caregiving duties and falls, with the exception of “household activities” which

reflected significantly lower odds of having reported a fall. Although the reasons for this association are unclear, this result could be due to selection bias and the nature of the task as defined (housework, home maintenance, and outdoor work). Individuals who are more physically robust and, potentially, less likely to fall, may be more likely than those who are less robust to choose to perform more physically demanding tasks. Furthermore, falls can result in functional limitations, so those who had previously fallen may be less likely to continue to engage in more physically demanding tasks, such as housework, after a fall. For example, in this study, caregivers who performed household chores were less likely to report mobility problems, although there were no significant differences related to chronic conditions or self-perceived health (analysis not shown). Longitudinal data in the United States has also suggested that the act of participating in increased physical activity, such as gardening, can result in fall reduction in seniors (Chen & Janke, 2012). Other population-based samples of older adults suggest that approximately one third of community-dwelling older adults fall annually, whereas only 19 per cent of respondents in our sample reported any fall within the previous 12-months (O’Loughlin et al., 1993), suggesting that the senior

caregivers in our sample may, indeed, have had better physical health.

Although there has been considerable discussion and disagreement about the impact of caregiving on health, emerging evidence suggests that in some conditions, caregivers are healthier than their non-caregiving controls (Roth, Fredman, & Haley, 2015). Certainly, it may be argued that at least initially, caregivers must be physically robust in order to provide assistance with activities of daily living or other housekeeping tasks. In our sample, this may explain the negative association between performance of household activities and falls. Other work, however, has shown that active seniors with health problems were at greater risk for falls due to greater environmental exposure and reduced capacity to avoid hazards. According to Bath and Morgan (1999), older adults reported a higher frequency of falls due to extrinsic (e.g., tripping, accidents) as opposed to intrinsic factors (e.g., dizziness and blackouts) – suggesting environmental hazards may play a role in older adult falls. We also found that better health, medication-taking, and slow walking speed were significantly associated with falling. One explanation of these results was that older adults who are the least healthy restrict their physical activity, and thus, have fewer opportunities to fall. Slow walking speed and medication-taking may have also served as a proxy for health problems among active elders, who would then be more likely to have increased exposure to extrinsic fall risks. The role of increased activity in the etiology of falls needs further investigation.

No significant associations were found between most types of caregiving duties and falling in this study; however, it is important to note that the analyses were also limited by the available data. Previous research has identified qualitative differences in perceptions of the demands of caregiving duties (Park et al., 2013), and caregivers who perceive greater demands, strain, or burden as a result of their caregiving are at higher risk of negative health outcomes (Schulz & Beach, 1999; Shaw et al., 1997). Indeed, in this study, fallers reported more frequent caregiving. As a result, future research that identifies the demand and difficulty associated with specifically defined caregiving tasks, as well as documents the length of time caregivers spend performing each of these tasks, may help to provide a better understanding of the potential relationship between caregiving duties and falls.

The results of this study with respect to sociodemographic, health, and caregiver related variables were consistent with previous research. Common sociodemographic variables, such as gender, income, and race, were not significantly associated with odds of having fallen (French, Margo, Tanna, Volpe, & Rubenstein, 2016).

Older age and vision were not significantly associated with falls in this study. Research has shown that when problems with mobility, gait, and balance are controlled, older age and general vision problems are not significantly associated with falls (Ganz et al., 2007).

This study has a number of limitations. The cross-sectional survey data did not permit determination of the temporal relationship between fall incidence and initiation of specific caregiving tasks. For example, the data are not specific as to which duties have been performed for what length of time, and the timing of a fall relative to those duties. As a result, we did not include fall frequency as a variable in our analysis. Research shows that those who fall once are approximately twice as likely to fall again (O'Loughlin et al., 1993). Thus, in this study, we focused on the initial fall as subsequent falls may be related to the initial falling episode, as opposed to the caregiving activities themselves. In addition, individuals who may have been seriously injured or incapacitated as a result of a fall would likely not have been represented in the data. For those respondents in the sample who did report an injurious fall, there were no significant associations between injurious falls (requiring medical attention within 48 hours) and the caregiving variables. However, we are unable to determine whether a particular subject may have changed caregiving duties as a result of a fall/injurious fall or if it is the caregiving duties themselves that may have precipitated the fall/severity of a fall.

Another potential limitation is that those who are most involved in caregiving may not be well represented in the sample. Some caregivers may be too busy with caregiving activities to respond to a survey, or may not consider their activities to be related specifically to caregiving, and thus were not included in the sample studied. In this case, the impact of caregiving activities might be underestimated in our study.

Reducing falls and supporting older caregivers are important to the Canadian health system. This study suggests that much more needs to be understood about the factors involved in risk of falls in older informal caregivers. It has been reported that modifying even a few factors can reduce fall risk and injury from falls (Tinetti et al., 1994). More research is needed to understand the possible predictors and mediators of fall risk in this population in order to ensure that effective fall prevention strategies can be appropriately designed for this important group.

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