Research Article

Social Isolation Among Spousal and Adult-Child Caregivers: Findings From the Canadian Longitudinal Study on Aging

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Abstract

Objectives: The caregiving outcomes of spousal and adult-child caregivers are widely studied since they are the most common source of support provided to adults. However, the literature on social isolation among spousal and adult-child caregivers is very limited. In order to further elaborate and specify unique caregiving outcomes, this study focuses on social isolation, both longitudinally and comparatively between spousal and adult-child caregivers.

Methods: This study was based on the Baseline and Follow-up 1 data from the Canadian Longitudinal Study on Aging. A total of 5,226 participants (1,293 spousal caregivers and 3,933 adult-child caregivers) were selected. The Linear mixed models were used to examine the effect of caregiver type and caregiving intensity on social isolation over the course of survey.

Results: Spousal and adult-child caregivers reported greater social isolation over time, and spousal caregivers exhibited a steeper increase in social isolation from Baseline to Follow-up 1 than adult-child caregivers. Also, an increase in caregiving hours resulted in greater social isolation. Finally, male spousal or adult-child caregivers were more likely to be socially isolated over time than their female counterparts.

Discussion: The findings of this study contribute to the existing literature on caregiving outcomes by demonstrating an association between family caregiving and social isolation. The results indicate a strong need for intervention programs that aim to enhance social connectedness among family caregivers, and especially for those who perform intensive caregiving, are older age, and are from a lower socioeconomic status.

Keywords: Caregiver type, Caregiving intensity, CLSA, Family caregiver, Social isolation

Providing care to older parents (including parents-in-law) or a spouse is the most common form of family caregiving in Canada, the United States, and other countries ([Family Caregiver Alliance, 2019](#)). In Canada, about 60% of family caregivers are supporting parents (47%) or a spouse (13%) ([Statistics Canada, 2020](#)). This pattern of family caregiving also reflects the hierarchical support model ([Miller & Guo, 2000](#)), whereby individuals prefer to receive primary support from spouses, if available, followed by adult children,

other kin, friends, and finally formal sources. Compared to the range of other family caregivers to adults, spousal and adult-child caregivers tend to experience the most negative consequences on their physical, social, and psychological well-being ([Li & Lee, 2020](#)).

Research to date has tended to cluster around particular topics including caregiving burden, stress and depression, and interventions to reduce psychological stressors ([Pinquart & Sörensen, 2003, 2007](#)). Yet, despite the

increasing knowledge on caregiving experiences among spousal and adult-child caregivers, the understanding of various caregiving outcomes over time, and the influence of caregiving context, is still relatively limited (Chappell et al., 2014). In addition, many studies have been conducted using local or convenience samples (Kang, 2006), making the generalizability or comparison of findings problematic. One significant gap in this field is research on the social aspects of caregiving outcomes, in particular, the effects of caregiving on social isolation (Cho et al., 2009).

We propose to investigate spousal and adult-child caregivers longitudinally and comparatively by examining the change in social isolation across different caregiving contexts over time, including intensity, and type. We also aim to examine the influence of other major determinants of social isolation that may be important in caregiving outcomes, such as gender. This study explores two primary research questions: (a) Will spousal and adult-child caregivers report more social isolation over time? and (b) Is there a disparity in social isolation between spousal and adult-child caregivers over time?

Spousal and Adult-Child Caregivers

As two primary groups of family caregivers, spouses and adult children have been shown to display different health and well-being caregiving outcomes, yet research remains equivocal as to which group is more challenged (Chappell et al., 2014; Rigby et al., 2019). Some studies have found that spousal caregivers report higher levels of caregiving burden, worse psychological well-being, and greater caregiving stress than adult-child caregivers (Oldenkamp et al., 2016; Ott et al., 2007). This difference is due to two primary factors. First, spousal caregivers tend to be older than adult-child caregivers, and thus, exhibit lower functional ability (Rigby et al., 2019). Second, compared to adult-child caregivers, spousal caregivers are much more likely to be the primary caregivers and living with the care receivers, thus assuming more intensive and comprehensive caregiving tasks, and spending significantly more time in providing care than adult-child caregivers (Chappell et al., 2014). A strong association between more intensive caregiving and deleterious health and well-being outcomes among family caregivers has been widely identified (Cohen et al., 2017). This situation is exacerbated because spousal caregivers are less likely to use community services than other family caregivers, and they also receive less support from other family members or friends (Oldenkamp et al., 2016).

It is paradoxical that several studies demonstrate less caregiver burden, better psychological well-being, and higher quality of life among spousal caregivers compared to adult-child caregivers (Chappell et al., 2014; Rigby et al., 2019). This disparity can be explained by taking spousal relationship and expectations of care into account. Spousal caregivers usually perceive caregiving responsibilities as part of their marriage contract and commitment,

while adult-child caregivers view caring for parents as a supplementary responsibility and tend to be less prepared (Lee & Smith, 2012). Due to these different perceptions of caregiving responsibility, adult-child caregivers may appraise caregiving as burdensome compared to spousal caregivers, and thus, to be more affected by caregiving tasks and workload. Adult-child caregivers also have competing multiple roles and responsibilities, such as employment and/or parenting roles, while spousal caregivers tend to have fewer competing commitments (Chappell et al., 2014; Lee & Smith, 2012). As a result, adult-child caregivers need to balance multiple demanding roles, which can potentially lead to higher levels of caregiving stress.

The existing literature provides a variety of perspectives and competing evidence to understand the potential burden and health outcome disparity between spousal and adult-child caregivers. However, the research is unequivocal that caregiving contextual factors need to be considered to understand the health and well-being caregiving outcomes among spousal and adult-child caregivers.

Social Isolation Among Family Caregivers

The definitions and measurements of social isolation have been inconsistent in the literature. Some researchers conceptualize social isolation using objective structural and/or functional elements of social relationships, including social contact, social support, and social participation (Newall & Menec, 2019). These approaches tend to differentiate social isolation and loneliness, the latter of which focuses on the subjective interpretation of social relationships, connections, and resources (Coyle & Dugan, 2012). However, while isolation and loneliness are highly correlated, they are not interchangeable. For instance, some studies show that loneliness is often attributed to being without others or limited social activity (Schultz & Moore, 1984), yet people can still feel lonely when they have many social contacts (Lee & Ko, 2017). While some studies analyze these concepts separately, other researchers have used them in combination. In particular, Valtorta et al. (2016) reviewed all available measures and developed a comprehensive conceptual model of social isolation that combines structural (network linkages and contacts), functional (behavioral beneficial elements) domains across objective and subjective measures. The authors incorporate loneliness under the subjective functional domain, forming a comprehensive social isolation conceptual/measurement model. Furthermore, social isolation and loneliness share many precursors and outcomes, and both are highly related to health and well-being among middle and old age population, such as chronic illness and life satisfaction (de Jong Gierveld et al., 2015; Valtorta et al., 2016; Wister et al., 2018). Thus, more recent developments have challenged the distinctive objective versus subjective dimensions of social isolation and loneliness, and have led to conceptualization and measurement of social isolation that combines objective network components with a subjective assessment dimension (Valtorta et al., 2016;

Weldrick and Grenier, 2018; Wister et al., 2019). Similarly, Weldrick and Grenier (2018) identified a trend in this literature since 2000, that shifted from defining social isolation (or loneliness) simply as objective or subjective, to more inclusive and multipronged definitions and measures. A comprehensive measure can capture the full context of social isolation, rather than only pay attention to a single dimension of social isolation or loneliness.

Studies have already established that becoming a family caregiver, particularly when supporting individuals with severe health conditions and intensive care needs, is associated with reduced social contact, withdrawal from social lives, and feelings of loneliness (Hayes et al., 2015; Musich et al., 2017; Robison et al., 2009). For example, Poon et al. (2019) found that, in their 1-year follow-up study, about 30% of family caregivers were isolated or very isolated at baseline, and remained in a low level of social connectedness at follow-up. Also, based on a 4-year follow-up study, Robinson-Whelen et al. (2001) demonstrated that both current and former caregivers experienced greater loneliness than noncaregivers, and the high level of loneliness remained even after the end of caregiving. Family caregivers are at risk for social isolation because they contribute their personal free time, and/or reduce their employment commitment to support family members in need (Green & King, 2007). Bass et al. (2012) used a social isolation scale containing both subjective and objective items and discovered that social isolation of family caregivers is significantly related to the cognitive impairment of care receivers, problem behaviors, chronic condition, and co-residence. Some family caregivers experience reduced social interaction; others refuse to seek support because of their reaction to being a family caregiver (e.g., embarrassment, shame, guilt) (Gray et al., 2010); while others socially distance themselves because of misunderstandings or stigma related to the health conditions of their care receivers, particularly mental illness, frailty, or incontinence (Brittain & Shaw, 2007).

Socially isolated individuals are more likely to have deleterious physical and psychological well-being, and a higher mortality rate (Coyle & Dugan, 2012; Wister et al., 2016). Social isolation among family caregivers affects both family caregivers and their care receivers. Williamson et al. (1998) showed that activity restriction resulting from family caregiving responsibilities increased caregiver depression, as well as resentful feelings toward both caregiving and their care receivers. Additional research confirms that greater isolation and/or loneliness are significantly associated with lower quality of life, negative well-being, and higher depression among family caregivers (Beeson, 2003; Larson et al., 2005; Matthews et al., 2004; Segrin et al., 2019). This condition can also spill over to care receivers. Cho et al. (2009) found that family caregivers who experience interruption to social activity were more likely to place care receivers into a nursing home. Some family caregivers of advanced age have also expressed frustration in having constricted

social contacts, which might further reduce their capability to provide care (Greenwood et al., 2019). Considering that the protective functions of social networks, social connections, and social support on the health and well-being of family caregivers have been widely recognized (Shiba et al., 2016), there is a strong rationale to examine social isolation resulting from family caregiving responsibilities.

Comparative research on social isolation outcomes among spousal and adult-child caregivers is also equivocal. Elmståhl et al. (1996) studied caregivers of family members experiencing stroke and found that spouses reported a higher level of isolation than children and other caregivers. This conclusion has also been supported by recent studies in which spousal caregivers (compared to adult-child caregivers) found it more challenging to combine caregiving and their daily activities, particularly when they received fewer supports from informal or formal sources (Oldenkamp et al., 2016; Rigby et al., 2019). Yet other studies show more complex results. Ott and associates (2007) did not observe a significant difference in isolation between spousal and adult-child caregivers when co-residing with care receivers; and spousal caregivers reported a higher degree of isolation than adult children only when the care receivers lived out of the home. Kang's (2006) research further showed that adult-child caregivers, compared to spousal caregivers, reported more limitations on their life, including their social activities, personal time with family, and opportunities for vacation. Similarly, based on 371 community-dwelling caregivers, Cho et al. (2009) found that wife caregivers experienced less interruption in social activities or contact outside the caregiver role than adult-daughter caregivers. Furthermore, Beeson et al. (2000) discovered that wife caregivers and daughter caregivers experienced similar levels of relational deprivation and loneliness, whereas husband caregivers reported the lowest levels. The inconsistent results pertaining to patterns of social isolation among spousal and adult-child caregivers emphasize the need for further investigation into this topic.

Theoretical Framework

This study was guided by the Stress Process Model (SPM) (Pearlin et al., 1981, 1990) and applied to our topic of caregiving adversity. Although there are different versions of this model, with many studies focusing on adjustment to caregiving (e.g., see Mackay & Pakenham, 2011), it has also been applied to understand the health and well-being outcomes of family caregivers. The SPM framework helps to elucidate the importance of caregiver background, caregiving context, and related stressors on burden, depression, and well-being (Knight & Sayegh, 2010; Mitchell, 2014; Pinquart & Sörensen, 2007). It is contended that these health consequences influence levels of caregiver social isolation.

A key tenet of the SPM is the notion of stress proliferation, which emphasizes that one stressor can stem

from another stressor embedded in the caregiving context (Pearlin et al., 2005). The stress proliferation process requires duration, and as such, it helps to explain how earlier caregiving stressors accumulate to affect the health and well-being and eventually social isolation of family caregivers over time. For instance, Kim and associates (2017) used a SPM variant to theorize the effects of stress factors reflecting the duration, amount, and type of care on the depressive symptoms of spousal caregivers, a factor that is also associated with isolation and loneliness (e.g., see Beeson, 2003; Cacioppo et al., 2010). Family caregiving tends to be a long-term family situation and a considerable proportion of family caregivers provide more than 5 years of support (24%), and even 10 or more years (15%) (National Alliance for Caregiving and AARP, 2015). Conceptually, this “wear and tear” is assumed to create social isolation over time because of cumulative stress and possible exacerbation of care demands (Kim et al., 2017; Lawton et al., 2000). Indeed, family caregivers often experience long-term adversity if their caregiving role is chronic. Therefore, this study proposes *Hypothesis 1: Spousal and adult-child caregivers will become more socially isolated over time.*

Additionally, according to the SPM, family caregivers who need to spend more time on caregiving, and/or perform more caregiving activities, tend to report increased caregiving stress and burden, and more health and well-being decline, than those who undertake less intensive caregiving (Lyons et al., 2015; Navaie-Waliser et al., 2002). One can surmise that long-term, intense caregiving weakens an individual's resolve to remain socially connected and also results in greater loneliness. Since spousal caregivers are more likely to be primary caregivers, they are more likely to assume higher intensive caregiving levels compared to adult-adult caregivers (Chappell et al., 2014). Thus, we propose *Hypothesis 2: Spousal caregivers will report a higher rate of increase in social isolation compared to adult-child caregivers; and Hypothesis 3: Greater intensity (hours of care) of caregiving over time will be associated with an increase in social isolation.* In addition, it is well-documented that women constitute the majority of family caregivers and undertake more caregiving responsibility and tasks than men (Fast, 2015; Pinquart & Sörensen, 2003). For instance, the gender of care receivers can affect who cares for whom, the amount of care provided, and same-gender caregiver preferences (Lee et al., 1993). In Canada, women tend to contribute 20 more hours per week toward caring for others than men, and their lifetime caregiving time has been estimated to be almost 5.8 years (compared to about 3.4 years for men) (Fast et al., 2013; Vanier Institute of the Family, 2017). Furthermore, previous studies have suggested that female family caregivers experience more relational deprivation and loneliness but receive fewer formal and informal supports than male caregivers (Bédard et al., 2005; Beeson et al., 2000; Miller & Guo, 2000; Rodríguez-Madrid et al., 2019). Thus, we further propose *Hypothesis 4: Female caregivers will report a higher level of social isolation compared to male caregivers.*

The influence of several background characteristics of caregivers, including age and ethnicity/cultural values, etc., has been established as having direct or indirect effects on caregiving outcomes (Knight & Sayegh, 2010; Pinquart & Sörensen, 2007). Sociodemographic background (e.g., being older), and the health conditions (e.g., cognitive status, problematic behaviors and dependency) of care receivers can act as stressors leading to a spectrum of adverse effects on caregivers' lives (Pinquart & Sörensen, 2007). Additionally, the socioeconomic status of family caregivers is also widely studied (Do et al., 2014), whereby lower socioeconomic status is associated with poorer health and well-being outcomes for caregivers due to limited resource access (Pinquart & Sörensen, 2007).

In sum, substantial but mixed findings have been uncovered regarding the health and well-being of spousal and adult-child caregivers. Social isolation is understudied among family caregivers, and a modified SPM provides a useful foundation to frame how caregiving contexts can influence patterns of social isolation among spousal and adult-child caregivers, especially when chronic or long-lasting.

Method

Data and Sample

The sample for this study was selected from the Baseline and Follow-up 1 data of the Canadian Longitudinal Study on Aging (CLSA). The CLSA is a national study with participants aged between 45 and 85 years old when recruited. There are two Cohorts in the CLSA: (a) the Comprehensive Cohort, participants who were randomly selected (within age/sex strata) among population residing within 25 km of a data collection sites (or 50 km in a lower population density area); and (b) the Tracking Cohort, participants who were randomly selected (within age/sex strata) from the 10 Canadian provinces and interviewed through computer-assisted telephone interview sites. The Baseline data were collected from 51,338 participants between 2011 and 2015, and the Follow-up 1 data were collected based on 44,817 participants between 2015 and 2018. Baseline and Follow-up 1 data waves were separated by approximately 3 years for participants. Detailed information about the CLSA is available elsewhere (Kirkland et al., 2015; Raina et al., 2009). Data are available from the CLSA (www.clsa-elcv.ca) for researchers who meet the criteria for access to de-identified CLSA data.

For the purpose of this study, participants who provided at least one type of assistance to another person were considered to be family caregivers, based on the question “During the past 12 months, have you provided any of the following types of assistance to another person because of a health condition or limitation?” The types of assistance included in the survey were personal care, medical care, managing care, help with activities (e.g., housework),

transportation, meal preparation, and others. Thus, the study samples were selected from the CLSA participants based on the following criteria: (a) participants provided at least one type of assistance to a family member or friend; (b) the relationship between participants and their main care receivers was the same at Baseline and Follow-up 1, including spousal caregivers and adult-child caregivers; and (c) the main care receivers were alive during the Baseline data collection. As a result, 5,226 participants (1,293 spousal caregivers and 3,933 adult-child caregivers) were included.

Measures

Social isolation

The dependent variable in the current study is social isolation, which is measured by the previously developed and validated Social Isolation Index (SII) using the CLSA Baseline data (Wister et al., 2019). Based on Valtorta et al.'s (2016) social isolation and loneliness conceptual framework, the SII incorporates both a structural-functional dimension and an objective-subjective continuum of social isolation and loneliness (Wister et al., 2019). The SII combines structural/objective dimension (five domains, including community/social participation, size of social network, contact with network, living arrangement and marital status), functional/objective dimension (the Medical Outcome Study Social Support Scale, including emotional/informational support, affectionate support, tangible support, and positive social interaction), and functional/subjective dimension (the single item about loneliness from Center for Epidemiological Studies-Depression scale, and a single question on the desire for more activity participation). While it is recognized that there are differences in social isolation indicators (e.g., loneliness vs social contacts), and that many studies isolate these domains, there are also compelling reasons to use a comprehensive index. These include: (a) SII provides a comprehensive measure that is driven by an empirically supported conceptual framework (Valtorta et al., 2016), (b) SII is a comprehensive composite index integrating different components of isolation, and (c) we are at a point in the knowledge-base, whereby testing innovative social isolation measures can enhance support for its relevance (Wister et al., 2019).

In order to calculate the SII score, a mapping system (converting all measures into scores between 0 and 10, Cosco et al., 2015; Wister et al., 2018) was applied to standardize all of the social isolation subindex variables. All of the subindex variables were summed and divided by the total score to convert them into a standard 0 to 10 subindex for the three SII dimensions. Therefore, the structural/objective dimension, functional/objective dimension, and functional/subjective dimension have equal weight. The scores of the three dimensions were summed and divided by 3 to produce the standardized SII score ranging from 0 to 10, where a higher number represents greater

levels of social isolation (see Wister et al., 2019 for full details). In the current study, the SII was calculated using the same procedure established by Wister et al. (2019) for both Baseline and Follow-up 1 of the CLSA. Initial analyses have established good concurrent validity of the SII based on four key outcome variables (life satisfaction scale, depression, perceived mental health, and perceived health). Regression analyses uncovered statistically significant moderate associations between SII and these hypothesized outcome measures in the expected direction, and are consistent with prior research (Wister et al., 2019).

Caregiver type

Spousal caregivers and adult-child caregivers are the two caregiver types used in this study. Spousal caregivers are participants who provide support to their spouse or partner in married or common-law relationships, and adult-child caregivers are participants who help their parents (including parents-in-law).

Caregiving hour per week

Caregiving intensity was measured using the amount of caregiving time provided by participants, measured by hours per week.

Gender

Gender was measured using a male and female binary.

Covariates

The study also controlled potential confounding influences of the family caregivers' background characteristics and caregiving contextual factors, all of which have been confirmed to be closely related to health and well-being outcomes among family caregivers (Pinquart & Sörensen, 2003, 2007). These variables include: (a) age (by age group, 45–54 years old, 55–64 years old, and 65 years and older), (b) highest educational attainment (some postsecondary education or less, and postsecondary degree/diploma), (c) annual personal income (less than \$20,000, between \$20,001 and \$50,000, between \$50,001 and \$100,000, and more than \$100,000), (d) visible minority status (visible minority, and not visible minority), (e) self-rated general health (poor/fair, and good to excellent), (f) self-rated mental health (poor/fair, and good to excellent), and (g) gender of participants' main care receivers (male and female). Finally, the CLSA Cohort type (Comprehensive Cohort and Tracking Cohort) was controlled in the data analysis.

Analytical Strategy

The data were analyzed using SPSS Version 25. Descriptive statistics were generated to provide an overview of the selected participants for the total sample and for spousal and adult-child caregivers separately, including bivariate

Table 1. Comparison of Caregiver Characteristics Between Spousal and Adult-Child Caregivers

	All caregivers (N = 5,226)	Adult-child caregivers (N = 3,933)	Spousal caregivers (N = 1,293)	$\chi^2(df)/t$ test
Baseline				
Cohort				1.75
Comprehensive	31.00	31.56	28.78	
Tracking	69.00	68.44	71.22	
Gender (%)				44.19 (1)***
Male	47.06	44.54	57.10	
Female	52.94	55.46	42.90	
Age group (%)				1770.42 (2)***
45–54 years	51.86	60.32	18.21	
55–64 years	31.80	33.43	25.28	
65 years and older	16.35	6.25	56.51	
Highest educational attainment (%)				31.30 (1)***
Some postsecondary education or less	19.43	18.13	24.63	
Postsecondary degree/diploma	80.57	81.87	75.37	
Annual personal income (%)				14.21**
Less than \$20,000	13.43	12.77	16.11	
Between \$20,001 and \$50,000	32.62	30.11	42.75	
Between \$50,000 and \$100,00	36.69	37.77	32.37	
More than \$100,000	17.25	19.36	8.77	
Visible minority status (%)				3.16 (1)
Visible minority	7.24	7.56	5.99	
Not visible minority	92.76	92.44	94.01	
Self-rated general health (%)				5.53 (1)*
Poor/fair	6.32	5.65	8.95	
Good to excellent	93.68	94.35	91.05	
Self-rated mental health (%)				2.34 (1)
Poor/fair	4.76	4.88	4.30	
Good to excellent	95.24	95.12	95.70	
Baseline				
Caregiving hour per week [mean (SD)]	7.59 (21.06)	4.41 (10.73)	20.45 (39.51)	–13.69***
Follow-up 1				
Caregiving hour per week [mean (SD)]	11.89 (30.28)	7.01 (18.67)	32.19 (52.62)	–14.60***

Notes: SD = standard deviation.

* $p < .05$. ** $p < .01$. *** $p < .001$.

statistics (see Table 1). In Table 2, the SII scores among spousal caregivers and adult-child caregivers were compared between groups based on each survey wave, as well as within groups over the course of the survey.

The longitudinal analysis of social isolation among spousal and adult-child caregivers from Baseline to Follow-up 1 was performed using linear mixed models (LMMs; Brown & Prescott, 2015). The LMM is well-suited for repeated measure data because it allows for the incorporation of random effects due to the repeated measures on the same individual, and it controls both within-subject and between-subject variability. The LMM can also account for the effect of time-invariant factors (e.g., gender and education), as well as the time-variant factors (e.g., caregiving hours in the current study). To capture the change of social isolation over the data collection periods, the survey wave was included as a control variable.

In this study, the focal predictor is the caregiver type. Therefore, an interaction effect between caregiver type and survey wave was included in the analysis to model the effect of caregiver type on the change in social isolation from Baseline to Follow-up 1. The only time-variant predictor in the data analysis was caregiving hours per week, and an interaction between caregiving time and survey wave, which was included to control for the impact of caregiver hours over time. An interaction between gender and survey wave was also incorporated to test the gender difference in social isolation over time, considering the impact of gender in the caregiving context. Other covariates were all time-invariant factors from the Baseline wave.

Two models were tested to examine the change of social isolation and potential predictors. In Model 1, the survey wave, the CLSA Cohort, caregiver characteristics, and caregiving contextual factors were included, and in Model 2 the

Table 2. Within- and Between-Group Comparison Among Spousal and Adult-Child Caregivers From Baseline to Follow-up 1

	Adult-child caregivers (N = 3,933)	Spouse caregivers (N = 1,293)	<i>t</i> test
Social Isolation Index at Baseline [mean (SD)]	2.84 (1.20)	2.87 (1.05)	-1.95
Social Isolation Index at Follow-up 1 [mean (SD)]	2.86 (1.21)	3.16 (1.19)	-6.85***
<i>t</i> test	-2.19*	-6.44***	

Notes: SD = standard deviation.

* $p < .05$. ** $p < .01$. *** $p < .001$.

caregiver type and its interaction with survey wave were added. The Akaike Information Criterion (AIC) was compared to estimate the model fit, and a lower number indicates better a model fit.

For the SII, missing values were imputed using mode for categorical variables, median for ordinal variables, and mean for interval variables. The independent variables had a minimum (under 5%) missing cases, and thus, list-wise deletion was applied during data analyses. In addition, as recommended by CLSA (<https://www.clsa-elcv.ca/>), the trimmed weight was applied for descriptive analysis, and the analytic weight was applied for bivariate and multivariate analyses. For all statistical analyses, the level of significance was accepted when $p < .05$.

Results

Among the selected sample of 5,226 participants, female participants (53%) constituted a higher proportion of family caregivers than males, and most family caregivers were middle-aged between 45 and 64 years old (84%). As indicated in Table 1, a significantly higher proportion of female participants were adult-child caregivers compared to spousal caregivers (55% vs 43%, $p < .001$). The majority of adult-child caregivers were aged between 45 and 54 years old (60%), and more than half of spousal caregivers were 65 years of age and older (57%). Also, as expected, a higher percentage of adult-child caregivers had finished postsecondary education than spousal caregivers (82% vs 75%, $p < .001$). Adult-child caregivers and spousal caregivers also differed in annual personal income, whereby significantly more adult-child caregivers earned more than \$50,000 compared to spousal caregivers (57% vs 41%, $p < .01$). In addition, approximately 94% of adult-child caregivers rated their general health as good to excellent, which is significantly higher than spousal caregivers (91%, $p < .05$). Finally, spousal caregivers provided significantly more caregiving hours per week than adult-child caregivers at both Baseline wave (20.45 vs 4.41, $p < .001$) and Follow-up 1 wave (32.19 vs 7.01, $p < .001$).

Table 2 shows the comparison of social isolation between spousal and adult-child caregivers at each survey wave, and also within spousal or adult-child caregivers from Baseline to Follow-up 1. At Baseline wave, a statistically significant difference between spousal caregivers and adult-child caregivers for social isolation was not

supported (2.84 vs 2.87, $p > .05$). At Follow-up 1 wave, a statistically significant association was found between caregiver type and social isolation, where spousal caregivers reported a higher level than adult-child caregivers (3.16 vs 2.86, $p < .001$). Additionally, from Baseline to Follow-up 1, the level of social isolation was increased significantly for both adult-child caregivers (2.84 to 2.86, $p < .05$) and spousal caregivers (2.87 to 3.16, $p < .001$).

The results from the LMM analysis are shown in Table 3. Model 2, with all variables of interest included, is presented below. Compared to Baseline, participants were more likely to report a higher score in SII during the Follow-up 1 wave (estimate = 0.20, $p < .001$). Along with the results from survey wave comparison, the first research question is answered, and the Hypothesis 1 is supported with the finding that spousal and adult-child caregivers report higher levels of social isolation over time. Caregiver type is also associated with change of social isolation over the 3-year time period between data points. The statistically significant interaction effect between caregiver type and survey wave indicates that from Baseline to Follow-up 1, spousal caregivers had a steeper increase in SII score compared to adult-child caregivers (estimate = -0.21, $p < .001$). These striking associations are pictorialized in Figure 1. Thus, Hypothesis 2 is supported with the finding that spousal caregivers experience higher rates of social isolation over time compared to adult-child caregivers.

Caregiving hours per week was not supported as a main effect predictor of social isolation (unless caregiving hours across survey time interaction was removed); however, the interaction between caregiving hours and survey wave was positive and statistically significant (estimate = 0.004, $p < .001$). This result suggests that an increasing number of caregiving hours results in more social isolation over time and supports Hypothesis 3. Gender did not result in a statistically significant main effect for social isolation, but a statistically significant interaction between gender and survey wave was supported (estimate = 0.07, $p < .5$). This suggests that male spousal or adult-child caregivers are more likely to be socially isolated than female ones, contrary to Hypothesis 4.

Another five factors were also found to be statistically significant predictors of social isolation among spousal and adult-child caregivers. Participants from the Comprehensive Cohort reported a lower level of social isolation compared to those from the Tracking Cohort

Table 3. Linear Mixed Model for Social Isolation Index Among Spousal and Adult-Child Caregivers

	Model 1		Model 2	
	Estimate	95% CI	Estimate	95% CI
Intercept	2.90***	2.77/3.03	2.78***	2.64/2.92
Survey wave				
Follow-up 1	0.02	−0.02/0.06	0.20***	0.13/0.27
Baseline (ref.)				
Cohorts				
Comprehensive	−0.08*	−0.15/−0.02	−0.09**	−0.15/−0.02
Tracking (ref.)				
Gender				
Male	−0.04	−0.11/0.03	−0.03	−0.10/0.04
Female (ref.)				
Gender * Survey wave				
Male * Survey wave	0.09**	0.03/0.14	0.07*	0.01/0.13
Female * Survey wave (ref.)				
Age				
45–54 years	−0.27**	−0.36/−0.19	−0.32***	−0.42/−0.22
55–64 years	−0.09*	−0.18/−0.01	−0.13**	−0.23/−0.03
65 years and older (ref.)				
Highest education attainment				
Some postsecondary education or less	0.08	−0.003/0.16	0.08	−0.002/0.16
Postsecondary degree/diploma (ref.)				
Annual personal income				
Less than \$20,000	0.23***	0.11/0.36	0.24***	0.12/0.36
Between \$20,001 and \$50,000	0.19***	0.09/0.29	0.19***	0.10/0.29
Between \$50,000 and \$100,000	0.12*	0.02/0.21	0.12*	0.03/0.21
More than \$100,000 (ref.)				
Visible minority status				
Visible minority	0.09	−0.03/0.21	0.09	−0.03/0.21
Not visible minority (ref.)				
Self-rated general health				
Poor/fair	0.26***	0.13/0.39	0.26***	0.13/0.39
Good to excellent (ref.)				
Self-rated mental health				
Poor/fair	0.47***	0.32/0.62	0.47***	0.32/0.63
Good to excellent (ref.)				
Gender of care receiver				
Male	−0.01	−0.08/0.06	0.001	−0.07/0.07
Female (ref.)				
Caregiving hour per week	−0.001	−0.003/0.001	−0.001	−0.003/0.001
Caregiving hour per week * Survey wave	0.003***	0.001/0.005	0.004***	0.002/0.005
Caregiver type				
Adult-child caregiver			0.17**	0.07/0.27
Spousal caregiver (ref.)				
Caregiver type * Survey wave				
Adult-child caregiver * Survey wave			−0.21***	−0.28/−0.14
Spousal caregiver * Survey wave (ref.)				
AIC	32,607.36		32,580.59	

Notes: The reference group in the analysis is indicated by (ref.); AIC = Akaike Information Criterion; estimate = estimates of fixed effects; 95% CI = 95% confidence interval.

* $p < .05$. ** $p < .01$. *** $p < .001$.

(estimate = −0.09, $p < .01$). When compared to family caregivers aged 65 years and older, those who were 45–54 years old (estimate = −0.32, $p < .001$), and 55–64 years old

(estimate = −0.13, $p < .01$) tended to report lower SII scores. Personal income is also significantly related to social isolation, and participants with lower levels of personal income

Figure 1. Social Isolation Index score predicted by caregiver type and survey wave. Full color version is available within the online issue.

were more likely to report higher scores in SII. In addition, participants who rated their general health as poor or fair (compared to good to excellent) exhibited higher SII scores (estimate = 0.26, $p < .001$). The same pattern is also identified for self-rated mental health (estimate = 0.47, $p < .001$).

Finally, due to the potential confounding effects of including marital status and living arrangement in the SII measure in a study of spousal caregivers, we repeated the above analyses with those two factors excluded. All substantive findings related to our hypotheses, including those related to gender, caregiving hours, and caregiver type were replicated; therefore, we use the original SII so that our findings can be compared to other studies using this measure.

Discussion

The current study contributes to the caregiving literature by providing compelling evidence of an association between social isolation and caregiving intensity among spousal and adult-child caregivers using a large national longitudinal data set. The findings also highlight the different transitions for both spousal and adult-child caregivers in reported social isolation over time. This work helps to extend and clarify prior findings in this emerging field that have been equivocal.

One significant contribution of this study is the utilization of two waves of panel data separated by 3 years in order to elucidate relationships between caregiving contexts and a comprehensive measure of social isolation. Our results also confirm that there is an increase in social isolation over time (Hypothesis 1); greater isolation among spousal caregivers compared to adult-child caregivers over time (Hypothesis 2); and increases in social isolation when there are more hours of caregiving over time (Hypothesis 3). This finding is consistent with previous literature demonstrating that caregiving demands take a greater toll on the health and well-being of spousal caregivers than

among adult-child caregivers (Ott et al., 2007; Rigby et al., 2019), and further establishes that spousal and adult-child caregivers are two unique groups in caregiving experiences. The results also extend and support theoretical assumptions based on the SPM (Pearlin et al., 1981, 1990). Specifically, the disparity in social isolation between spousal and adult-child caregivers was evident at Follow-up 1 wave but not at Baseline wave, which is indicative of a proliferated stress process that manifests itself into social isolation.

Several reasons can explain the steeper increase in social isolation among spousal caregivers than for adult-child caregivers. First, a high level of intensive caregiving is widely recognized as a pivotal cause of adverse caregiving outcomes (Cohen et al., 2017), and spousal caregivers usually engage in more intensive caregiving compared to other family members or friends. Based on the CLSA, spousal caregivers provided an average of 20 hours per week of care at Baseline wave, and this number increased to about 32 hours per week at Follow-up 1 wave 3 years later. Adult-child caregivers provided an average of four caregiving hours per week at Baseline wave, and about 7 hours at Follow-up 1. Family caregivers whose weekly caregiving hours are over 20 hours are usually viewed as “intensive carers,” and the deleterious effects of longer caregiving time/intensity on employment, mental health, and other life domains among family caregivers are well-documented (Kumagai, 2017; Legg et al., 2013). Thus, the more time that family caregivers spend on supporting family members or friends, the less time they have to participate in social activities, or to develop and maintain social connections with others.

Second, there may be aging-related processes that affect social isolation across caregiver type. In this study, more than half (57%) of spousal caregivers were 65 years and older, meanwhile the majority of adult-child caregivers were younger than 65 years old (94%) at Baseline wave. These patterns are consistent with previous studies (Kang, 2006; Ott et al., 2007). Furthermore, older age groups have been shown to be strongly associated with social isolation in other studies (Toepoel, 2013; Weldrick & Grenier, 2018). In addition, older spousal caregivers spend much more time at home due to proximate caregiving needs; and accumulated evidence has confirmed the higher risk of social isolation among seniors who are caregivers (The National Seniors Council, 2014). Some studies also show that older family caregivers receive less help and support from other family members or friends than younger family caregivers, such as financial support (Hango, 2020; Jaffe & Blakley, 2000). When age group is statistically controlled, the combination of aging and caregiving over the period of study likely place some individuals at double jeopardy of social isolation. Therefore, older age might be a critical factor in explaining the increase in social isolation among spousal caregivers in this study.

Third, being a spousal caregiver per se could be a stressor leading to social isolation. The time horizon of

caregiving responsibility is expected to be long in duration and associated with considerable changes in daily life. Spouses are the first choice as caregivers, and they typically provide care from the onset of health symptoms of care receivers, making them the likely primary caregiver (Cho et al., 2009). A recent study (Ornstein et al., 2019) based on eight waves of Health and Retirement Study in the United States from 2000 to 2014 revealed that about 55% of spousal caregivers served as solo caregivers before the death of their partners. Another scenario is that spousal caregivers continue to provide care even after the institutionalization of care receivers. King et al. (1991) supported this contention, finding that the institutionalization of care receivers had a more positive impact on the daily lives of adult-child caregivers than spousal caregivers. Thus, spousal caregivers usually experience what we consider to be the long journey of caregiving. In addition, due to the marriage commitment, spousal caregivers tend to assume most of the caregiving role rather than seeking external support that can reduce social isolation. In a dementia caregiver study, Rigby et al. (2019) found that spousal caregivers reported lower levels of social support from all four dimensions (emotional, tangible, affective, and positive social interaction) than adult-child caregivers over the course of disease stages.

Finally, becoming a spousal caregiver leads to many modifications in daily life or lifestyle. For example, some spousal caregivers must retire early or change retirement plans to prioritize the care needs of their partner with long-term health needs (Green & King, 2007). The combination of workforce and caregiving double duty can create stressors that can potentially constrain maintenance of social connections. Also, as the primary persons providing personal care, spousal caregivers usually need to invest extra time and effort to gain new medical knowledge about the disease or health situation, especially dementia care (Williams, 2011). Therefore, the need to perform long-term intensive caregiving and the gradual shift to fulfill the complex needs of care receivers accumulate in their influence on social isolation among spousal caregivers.

In our study, the association between caregiving hours per week and social isolation was not supported, while the increase in caregiving intensity over time significantly predicted an increase in social isolation. Previous literature presents contrasting findings regarding caregiving and different aspects of social relationships. For instance, a negative association between time spent on caregiving and volunteering has been identified (Choi et al., 2007). In addition, Farkas and Himes (1997) reported that higher participation in voluntary or causal activities, and more interaction among kin networks, was observed among younger female caregivers compared with noncaregivers. The mixed results in the literature supporting outcomes of social isolation among family caregiving might be a result of differential social isolation measures, since many scales tend to focus on a single aspect of social isolation/engagement, such as volunteerism,

community participation, or contact with family or friends (Cho et al., 2009). One strength of our study is the utilization of the SII in measuring social isolation, which comprehensively incorporates both structural and functional elements, as well as objective and subjective elements, of social isolation. This study further confirms that the increase in caregiver hours per week is leading to an increase in social isolation from Baseline to Follow-up 1. This result emphasizes the salience of examining changes in caregiving demands, since it is common for individuals to increase their caregiving hours to meet more caregiving responsibilities due to deteriorating health conditions of care receivers.

Interestingly, in our study, male family caregivers tend to report a higher level of social isolation than their female counterparts over time. One possibility is that male caregivers tend to be influenced by gender role expectations and demands of caregiving, such that they might choose to narrow social connections after becoming a family caregiver, or to resist seeking support from informal or formal resources (Coe & Neufeld, 1999). Rodríguez-Madrid and colleagues (2019) have discovered that female caregivers have larger, more close-knit and proximate social networks than their male counterparts. Since the gender differences in patterns of social isolation in our study divert from the general literature pertaining to a female disadvantage in caregiving outcomes, further research is required using additional measures and other longitudinal data sets and populations.

There are several additional predictors of social isolation among spousal and adult-child caregivers. The CLSA Cohort significantly predicts social isolation, and participants from the Tracking Cohort are more socially isolated than Comprehensive Cohort participants. A possible reason for this difference is that participants in the Comprehensive Cohort are, by design, sampled from urban areas, whereas the Tracking Cohort is comprised of participants from both urban and rural areas. This disparity could be attributed to the fact that living in the rural or remote community could be a risk factor for social isolation (The National Seniors Council, 2014). Age is a significant predictor of social isolation, and family caregivers aged between 45 and 64 years old reported lower levels of social isolation than those who were older than 65 years old. The aging process accelerates social isolation among family caregivers (The National Seniors Council, 2014). Lower personal income also leads to greater social isolation. It is well-documented that family caregivers with higher social economic status tend to have more resources to manage the family caregiving responsibility and sequencing caregiver burden (Do et al., 2014). Also, the general health and mental health of family caregivers both exhibit negative associations with social isolation. This finding resonates with previous studies, suggesting the need for promoting health and well-being of family caregivers to balance family caregiving and other daily life activities, including keeping

active and healthy, as well as to maintain social connection and social participation (Schulz et al., 2016).

Implications

In tandem with the growing literature on the social consequences of being a family caregiver, the present study reveals that both spousal and adult-child caregivers experience greater levels of social isolation over time, but more for spousal caregivers. This observation suggests that spousal caregivers are more disadvantaged in maintaining social connections and relationship, and caregiver intensity can lead to social isolation. Enhancement of community-based, Internet-based, or social media-oriented programs and interventions are needed to support family caregivers to maintain social connectedness and interaction, and to reduce the feeling of loneliness (Boots et al., 2014; Colvin et al., 2004; Eloniemi-Sulkava et al., 2002). Special attention needs to be given to older spousal caregivers, who tend to be the primary or even solo caregivers. Peer-to-peer programs have been shown to be effective for health outcomes, and may also reduce social isolation. Tailored support programs should be delivered to this group of family caregivers, considering their caregiver intensity, deleterious health and function, and limited social network.

Social isolation is not a new topic in family caregiving, but it arises as a critical social aspect of caregiving outcomes in this research. It is also a very timely topic area, given the COVID-19 pandemic, which will undoubtedly transform the future of caregiving and social connections, and particularly among the more vulnerable members of society. Moreover, the study of vulnerable groups and social isolation lag behind the study of related topics such as caregiving burden or psychological well-being. While isolation and/or loneliness have been peripherally included in examining caregiver burden, strain, or emotional reaction (Eloniemi-Sulkava et al., 2002; Matthews et al., 2004), there has been a limited specific focus on these social dimensions, and further, insufficient analysis of its situation and impact. Future family caregiving studies should address social isolation as one vital aspect of family caregiving and extend current knowledge around this topic, especially examining the longitudinal effect of family caregiving on social isolation, given the fluid nature of this relationship. These studies should also pay close attention to diversity both between and within caregiver groups (e.g., socioeconomic status) and their intersections with other spheres of cumulative advantage/disadvantage across the life course.

Several limitations of this study require identification and clarification. This study did not control the health conditions of care receivers in the data analyses because the CLSA did not collect all relevant information. Health conditions or impaired behaviors of care receivers are significantly associated with caregiver burden and could be a

potent predictor of social isolation among family caregivers (Robison et al., 2009). Despite this potential weakness, this limitation also functions as a strength of this study, since family caregivers might provide support to their primary care receivers for a series of health conditions, age-related, or frailty reasons. Thus, the results of this study could be applied to a broader population of family caregivers, rather than limiting to certain types of caregivers, such as dementia caregivers or after-stroke caregivers. However, future research should also be conducted on subgroups of care receivers. In addition, our measure of social isolation entails a comprehensive index based on available, yet common, indicators found in the CLSA. Confirmation of our results should also be conducted using other measures and indicators, including the removal of potential confounders, such as marital status and living arrangement of family caregivers. Also, due to the utilization of a composite index of social isolation, this study cannot specifically address the impact of a particular element of social isolation (e.g., social contact or loneliness) on caregiving outcomes. The SII also gives more weight to social isolation domains (two-thirds) than the loneliness domain (one-third), in keeping with the conceptual model. Considering that the study of isolation and loneliness among family caregivers is in its infancy, future research needs to further examine social isolation among family caregivers, both as a comprehensive measure, and individually. Furthermore, the current study only included spousal and adult-child caregivers who were aged between 45 and 85 at the Baseline wave. Therefore, interpretation of results should be made with caution when applying the findings to family caregivers in other age groups, or other types of family caregivers, such as caregivers for adult children with disabilities or extended kin. Also, the participants in this study were spousal or adult-child caregivers at both Baseline and Follow-up 1 waves, and were family caregivers for at least 3 years. Therefore, our findings are more relevant for long-term caregivers, rather than for caregivers supporting others, due to incidents or surgery in a short term.

Conclusion

Our findings demonstrate that spousal caregivers experience greater social isolation over time compared to adult-child caregivers. This study also highlights the negative impact of long-term accumulated caregiving stress on the social connections, social participation, and perception of loneliness among family caregivers. Research that focuses on vulnerable groups most at risk of social isolation needs to incorporate caregiving contexts and their timing and pathways in order to understand the multiple dimension of caregiving experience. Finally, the results of this study provide evidence for the development and implementation of intervention programs aimed at diminishing social isolation among family caregivers, and to provide direction for future studies.

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Conflict of Interest

The authors have declared that no competing interests exist. The opinions expressed in this manuscript are the authors' own and do not reflect the views of the Canadian Longitudinal Study on Aging.

Author Contributions

L. Li: main writer of manuscript; A. V. Wister and B. Mitchell: secondary authors made substantial contributions to the conception, design and editing of the manuscript, and interpretation of the data. All authors have read and approved the final version of the manuscript and have agreed to be accountable for all parts.

Ethics Approval and Consent to Participate

This current project received ethics approval at two levels. Consent to participate was obtained for all participants under the CLSA harmonized multi-university ethics process approved by the Hamilton Integrated Research Ethics Board (HiREB), Hamilton Health Sciences/McMaster University. Written consent was obtained from all CLSA participants prior to enrollment. Individuals who were not deemed to be cognitively functional were excluded from the CLSA study. Simon Fraser University (SFU) was a participating institution in the CLSA data collection, and the SFU Office of Research Services Ethics Committee reviewed all consent material prior to data collection (SFU ORS #2010s0281).

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