Three Essays on the Time Use and Well-being of Retirees

by

Eakamon Oumtrakool

A Dissertation

In

Personal Financial Planning

Submitted to the Graduate Faculty
of Texas Tech University in
Partial Fulfillment of
the Requirements for
the Degree of

DOCTOR OF PHILOSOPHY

Approved

Dr. Charlene M. Kalenkoski
Chair of Committee

Dr. Russell N. James III

Dr. Chris Browning

Dr. Terrance Martin

Mark Sheridan
Dean of the Graduate School

December 2018

Acknowledgments

This dissertation would not have been possible without the support of my family and my committee members. I would like to thank my dissertation chair Dr. Charlene M. Kalenkoski for her guidance, mentorship, patience, and time in reviewing this dissertation. I would like to thank the other members of my committee, Dr. Russell N. James III, Dr. Chris Browning, Dr. Terrance Martin, for their helpful comments and ideas to improve the dissertation.

Table of Contents

Abstract

Once in retirement, retirees are no longer engaged in the labor market. Thus, they have more available time than non-retirees to participate in leisure and household work, such as child care for a grandchild or the care for a sick spouse or frail parents. Due to the ageing society and increased life expectancy, the demand for informal caregivers has rapidly progressed in recent decades. The U.S. health care system relies heavily on informal caregiving, and older individuals or retirees provide much of the needed help. While caregiving may be a rewarding experience, it can also be a stressful responsibility that impacts the subjective well-being of caregivers. Thus, sound knowledge about the impact of informal care provision on the well-being of caregivers is becoming more and more important. There is a growing literature of cross-sectional studies, which examines the effects of caregiving on the well-being of caregivers. In addition, most of the studies show that informal caregiving is associated negatively with the subjective well-being of caregivers. However, most studies ignore the issue of endogeneity caused by self-selecting into caregiving roles. This dissertation explores different subjective well-being measures while accounting for selection into caregiving roles.

The first chapter investigates how caregiving affects the life satisfaction of retirees who are caregivers. Employing an instrumental variable approach to control for selection into caregiving, the results show that caring for household adults negatively affects the life satisfaction of retirees. However, caring for non-household adults is associated positively with the life satisfaction of retirees. Thus, policies which remove

some of the burden of caring for household adults from retirees while encouraging their caring for non-household adults would increase retirees' life satisfaction.

The second chapter examines how caregiving affects the experienced well-being of retirees who are caregivers. The unpleasant index (U-index) is used as a proxy of experienced well-being. The results show that, controlling for selection into caregiving, both caring for adults and caring for children negatively affect the experienced well-being of retirees. This suggests that policies that remove some of the caregiving burden from retirees would increase their experienced well-being.

The third chapter examines how caregiving affects life satisfaction of older individuals and retirees who are caregivers over time. Taking advantage of the panel structure of the data, fixed-effect logistic models are estimated separately by gender to account for omitted variable bias due to unobserved heterogeneity. The results show that caring for adults and caring for children over time both are associated positively with the life satisfaction of wives who are at least 50 or older. In addition, caring for children is associated negatively with the life satisfaction of both retired husbands and wives, while caring for adults is associated positively with the life satisfaction of both retired husbands and wives.

List of Tables

Chapter I

The Life Satisfaction and Caregiving Responsibilities of Retirees

Abstract

Using data from the 2012 American Time Use Surveys (ATUS) and the associated Well-being Modules, this paper examines how caregiving affects life satisfaction of retirees who are caregivers. Retirees may provide care to their elderly parents, spouse, children, or grandchildren, who may or may not reside with the retirees. Not only may providing care be physically and emotionally demanding, but it may also impact the overall quality of life of retirees. Life satisfaction is measured using the Cantril Ladder scale. Using an ordered probit model and controlling for selection into caregiving, the results show that caring for household adults negatively affects the life satisfaction of retirees. However, caring for non-household adults is associated positively with the life satisfaction of retirees. This suggests that policies which remove some of the burden of caring for household adults from retirees while encouraging their caring for non-household adults would increase retirees' overall well-being.

Key Words: informal caregiving, subjective well-being, life satisfaction, retirement, time use

1. Introduction

After many years of working, retirement is the next, usually more leisurely, phase of life. Some may view retirement as a time to relax, travel, volunteer, and spend time with their families. Retirees reallocate the time freed up by retirement to engage more in personal care activities, leisure activities, or household production activities (Kalenkoski & Oumtrakool, 2014). However, retirement may not turn out always as people expect. Retirees may face additional responsibilities such as providing informal care for an elderly parent, spouse, children, or grandchildren.

There is an increasing demand for informal caregiving due to population aging. It is estimated that around 43.5 million adults in the U.S. provided unpaid or informal care to an adult or a child in 2014, and the profile of the typical caregiver is a 49-year-old female. Furthermore, 53 percent of caregivers are individuals aged fifty and older (Greenwald & Associates, 2015). Therefore, a significant proportion of older adults are engaging in caregiving.

Using the 2002 Health and Retirement Study, Johnson and Schaner (2005) finds that 38.9 percent of adults aged 55 and older provide care for their parents and in-laws, frail spouses, children, and grandchildren. Within this group, grandchild care is the most frequent care provided, followed by parental care, spousal care, and child care. Parker et al. (2015) also report that 22 percent of grandparents in the U.S. regularly help their children with child care. According to the U.S. Bureau of the Census (2015), in 2015 approximately 2.6 million grandparents had primary responsibility for one or more grandchildren under age 18 who were living with them. Approximately 1.1 million of these grandparents were retired individuals. Johnson and Schaner (2005) also report that

about 7% of the adults provide care for multiple generations of relatives, that the likelihood of providing spousal care increases with age, and that the likelihood of providing child and grandchild care decline with age.

Informal caregiving also has economic effects. According to Chari et al. (2015), caregivers' total opportunity cost associated with informal care is $522 billion annually. Without informal caregiving, it could cost the government and those who need care $642 billion annually to replace informal care with professional caregivers.

Considering the substantial amount of informal care given by older individuals and its economic value, it is important to examine whether and how informal caregiving affects the well-being of these older caregivers. Most research is this area focuses on care provided to specific groups of care recipients, such as frail older adults, adults suffering from dementia, and adults with a brain injury or stroke, by general groups of caregivers. However, the current study focuses on retirees who provide care to more general groups of adults and children, both non-coresident and coresident. Results show that, when controlling for selection into caregiving, caring for household adults negatively affects the life satisfaction of retirees. However, caring for non-household adults is associated positively with the life satisfaction of retirees. Caring for children is not related to the life satisfaction of retirees.

2. Literature Review

2.1 Household Production Model

According to the standard household production model (Becker, 1965), a household is comparable to a factory producing a utility-maximizing set of commodities subject to a budget constraint and a time constraint. Individuals consume and derive utility, i.e., happiness or satisfaction, from household commodities such as the well-being of grandchildren, a spouse, and other family members. These commodities are produced with purchased goods and services and contributions of time.

The production of a household commodity can be either "goods intensive" or "time intensive." A goods-intensive commodity requires more purchased goods and services than time for production. A time-intensive commodity utilizes more time for production than it does purchased goods and services. Because retirees have more available time than non-retirees, they may employ more time-intensive production techniques than non-retirees (Hurd and Rodwedder, 2003; Ward-Batts, 2008). Kalenkoski and Oumtrakool (2014) show that retirees spend more time on household production activities than non-retirees. However, while many have examined consumption of goods and services in retirement (McConnel and Deljavan, 1983; Mitchell and McCarthy, 2002; Butricia and Mermin, 2005, 2006; Stephens and Unayama, 2012), time spent producing household commodities, such as caregiving, in retirement largely has been ignored.

Caregiving also may affect the utility of caregivers directly, meaning that caregivers can derive utility from an improvement in the health or well-being of the care recipient as well as from the caregiving activity itself. The utility or disutility derived

11

from engaging in caregiving activities is called process utility (Kalenkoski, 2017). The household production model predicts that a person will undertake caregiving activities if it provides positive net utility. However, caregiving involves burdens. Fawcett, (1988) shows that caring for children is associated with three types of burdens: time cost, psychosocial stress, and financial cost. These burdens have negative psychological impacts on the caregivers, which may lead to disutility. Caregiving also may be involuntary, which constrains a person's utility maximization process and decreases his or her utility. Schulz et al. (2012) show that a lack of choice in taking on caregiving responsibilities is associated positively with emotional stress (Winter et al., 2010), physical strain, and a negative health impact.

2.2 Subjective Well-Being

Subjective or self-reported well-being refers to how individuals experience and evaluate their lives and specific domains and activities in their lives (Stone and Mackie, 2014). This construct helps researchers understand how individuals think and feel about their lives and experiences. It is relatively stable over time (Lucas & Donnellan, 2007) and usually recovers after major life events (Oswald and Powdthavee, 2008). The literature has shown that demographic factors such as income, health, attained education level, and marital status account for a small part of the variation in well-being.

Researchers assess quality of life using measures of subjective well-being, economic stability, and social indicators (Diener and Suh, 1998). Studies on retirees' well-being focus primarily on economic well-being measured by the level of retirement income and net worth (Levine et al., 2000). These financial measures only aim to

quantify the adequacy of financial resources. By focusing primarily on economic well-being, studies have overlooked the importance of nonfinancial factors to the overall quality of life of retirees (Frey and Stutzer, 2002).

Subjective well-being is multifaceted and can be categorized into experienced ("hedonic" or "emotional") well-being and evaluative well-being (i.e., overall life satisfaction) dimensions. Experienced well-being captures individuals' emotional states associated with recent activities, such as momentary positive (e.g., happy and meaningful) and negative (e.g., sad, painful, tired, and stressful) affective states (for example Kalenkoski and Oumtrakool, 2017; Kalenkoski, 2017), whereas evaluative well-being or life satisfaction—the focus of this current study— cognitively reflects individuals' long-term attitudes about or satisfaction with their lives as a whole (National Research Council, 2012). Life satisfaction is also one of the most important factors that define successful aging (Tate et al., 2003; Depp and Jeste, 2006).

Although life satisfaction and experienced well-being are correlated, life satisfaction differs from experienced well-being. Thus they can be assessed as separate dimensions (Andrews and Withey, 1976; Stone and Mackie, 2014; Kapteyn et al., 2015; Dolan et al., 2016). For example, a person providing care to a frail spouse may experience negative emotional well-being due to feeling tired and stressed, but at the same time feel satisfied with life overall. Therefore, it is possible that informal caregiving might have different associations with life satisfaction and experienced well-being. Informal caregiving may be viewed as a burden as well as a meaningful and rewarding activity at the same time.

2.3 Caregiving and Well-Being of Caregivers

The existing literature has provided mixed evidence regarding the effects of caregiving on the well-being of caregivers. Caregiving activities may benefit the caregivers in numerous ways and may contribute to their well-being and overall life satisfaction. However, most studies have concluded that caregiving is associated negatively with the well-being of caregivers.

Regarding caring for children, Pollmann-Schult (2014) examines the association between parenthood and subjective well-being and shows that parents of minors do not report higher levels of satisfaction with their lives than childless couples. Caring for one's children is itself a rewarding experience and provides a sense of purpose, which enhances the life satisfaction of parent. However, these positive effects are offset by financial costs, time costs, and psychosocial stress. Grandparents also play a significant role in child care. However, custodial grandparenting is related to elevated depressive symptoms, declined life satisfaction, and worst physical health (Szinovacz et al., 1999; Musil et al., 2010).

Regarding caring for adults, studies have shown that caregiving is associated with a sense of satisfaction from providing care back to parents, enjoyment from spending time with elderly care recipients (Scharlach, 1994), an improvement in relationships with care recipients (Walker & Allen, 1991; Marks et al., 2002), feeling good about being able to provide care to injured family members (Wells et al., 2005), a higher level of sense of purpose in life (Marks et al., 2002), lower blood pressure (Piferi and Lawler, 2006), and increased caregivers' longevity (Brown et al., 2003).

The types of caregiving and recipients also affect the subjective well-being of caregivers. Butrica and Schaner (2005) use data from the Health and Retirement Study to investigate the relationship between activity-engagement level and retirement satisfaction. One of the activities is caregiving. They find that retirees who provide caregiving are less likely to be satisfied with retirement. A study by Kalenkoski and Oumtrakool (2017) uses the ATUS data to examine the effect of caregiving on the emotional well-being of retirees who provide care. Similar to this study, they categorize care into care for household adults, care for non-household adults, and child care. They find that most caregiving negatively affects the emotional well-being of retirees. Studies of caregivers who provide care to adults requiring human assistance in at least one activity of daily living (ADL) limitation suggest that caregivers have worse health, more doctor visits, more anxiety and depression, and more weight loss than non-caregivers (Ho et al. 2009; Chan et al., 2013). Pinquart and Sorenson (2003) perform a meta-analysis based on findings from 84 articles that examine differences in the well-being of caregivers providing care for frail older adults and non-caregivers. They find that caregivers have higher levels of stress (also see Schulz et al., 2012) and depression (also see Marks et al., 2002; Malhotra et al., 2012) and lower levels of subjective well-being (i.e., life satisfaction and positive affect scales), physical health, and self-efficacy than non-caregivers. Caring for a spouse who has survived a stroke (Forsberg-Warleby et al., 2004; Visser-Meily et al., 2005) or who suffers from dementia or lung cancer (Haley et al., 2001) also is associated with decreased life satisfaction of the spouse caregiver.

Regarding the intensity of care, Borg and Hallberg (2006) categorize older adults into frequent caregivers, less-frequent caregivers, and non-caregivers. They find that

frequent caregivers are more likely to report lower life satisfaction than less frequent and non-caregivers. Full-time caregiving grandmothers report lower life satisfaction than part-time and non-caregiving grandmothers (Bowers and Myers, 1999). Whether care recipients reside with caregivers also affects the well-being of caregivers. Men who provide nonresidential care to a parent have lower life satisfaction while men who provide co-resident care for a parent have higher life satisfaction compared to non-caregivng men (Marks et al., 2002). Despite using different measures and samples, most findings point to the conclusion that caregivers are likely to have lower life satisfaction than non-caregivers.

A limitation of existing studies is that they focus on a general group of caregivers, such as adult caregivers, and on a specific group of care recipients, such as frail older adults, adults with ADL, or adults suffering from stroke, dementia, or cancer, and thus their results may not apply to caregivers of other adults or children. None of these studies focuses specifically on retirees. This study fills a gap in the literature by focusing on the well-being of caregivers who are themselves retired. This study focuses on retired individuals who are caregivers and examines caregiving for any adults and children, regardless of whether the recipient of care is physically frail or suffers from dementia, in order to determine the effects of more general caregiving on the retirees providing care. Finally, while many studies of caregivers rely on small samples or primary data, this study uses the large, nationally representative American Time Use Surveys and its Well-being Modules (WBM).

3. Method

3.1 Data

This analysis uses data from the 2012 ATUS and its Well-being Module (WBM). The ATUS is a nationally representative and cross-sectional survey. ATUS respondents were chosen from participants in the Current Population Survey (CPS). After completion of the CPS, one respondent aged 15 or older per household was selected for the ATUS. Each respondent to the ATUS answered some survey questions and completed a 24-hour time diary covering the period between 4 a.m. on the day before the interview and 4 a.m. on the day of the interview. Respondents provided information on the activities they performed on that day, at what times, and with whom. Life satisfaction measured by Cantril Ladder scale was first added to the Well-being Module in 2012.

This study examines retired respondents. The final sample was reached by deleting respondents with missing life satisfaction or demographic information. The sample includes 1,932 retirees who also completed life satisfaction questions in the WBM. For this study, retirees are defined as individuals who, at the time of the survey, were at least 50 years old, were not currently in the labor force, and did not report any time spent on work or work-related activities, or travel related to work on their diary day. In addition, they reported being retired or that they didn't want a job. Information on the retirees' gender, marital status, race, ethnicity, education, income level, region of residence, and household composition (number of adults and children in the household) is obtained from either the ATUS or CPS survey. Weights provided within the survey are used to adjust the sample to be nationally representative.

Figure 1 shows that over 21 percent of retirees provide at least one type of caregiving. Figure 2 illustrates the types of care provided by retirees. The types of care are classified as: care for non-household adults, care for household adults, and care for children. Almost 35 percent of retiree caregivers provide care for non-household adults only. Just over 28 percent provide care for household adults only. Just over 30 percent provide care for children only. Almost 7 percent provide care for more than one type of recipient.

Dependent Variables

Life satisfaction is assessed with the Cantril's Ladder scale (Cantril, 1965), which measures the general quality of life of respondents. It is a 10-point-ordinal scale question in which respondents are asked to: "Please imagine a ladder with steps numbered from zero at the bottom to ten at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. If the top step is 10 and the bottom step is 0, on which step of the ladder do you feel you personally stand at the present time?"

The sample average of life satisfaction is almost 8. For purposes of this study, the scale is grouped into three categories: low, moderate, and high because there is not enough variations and a small number of observations in the score of 0 to 4, which account for almost 6% of sample.[1] If the score is less than or equal to 5 (i.e., below the mean minus one standard deviation), it is classified as low life satisfaction. If the score is greater than or equal to six, but less than 9, it is classified as moderate life satisfaction. If

---

[1] Table 1.7 in the appendix A presents the distribution of life satisfaction score.

the score is greater than or equal to 9 (i.e., above the mean plus one standard deviation), it

is classified as high life satisfaction. After grouping, low, moderate, and high life

satisfaction categories account for 18.93%, 45.80%, and 35.27% of sample respectively.

The classification is similar to the criteria used by Averina et al. (2005) and Janssen

(2016). Therefore, the life satisfaction variable is a categorical variable coded as 1 if

respondents report low life satisfaction, as 2 if respondents report moderate life

satisfaction, and as 3 if respondents report high life satisfaction.[2]

Explanatory Variables

The key explanatory variables are indicators for the three types of caregiving that

are examined in this paper: caring for household adults, caring for non-household adults,

and caring for children or grandchildren. These variables are dichotomous with a code of

1 if the respondent reports time spent on the type of care and a code of 0 if no time is

spent. Initially, this study investigates four types of caregiving. However, the models do

not converge because the variables caring for household children (N = 36 or 1.8% of

sample) and non-household children (N = 98 or 5% of sample) separately do not have

enough variation. Therefore, the two types of child care are combined into one child-care

variable.

To account for differential preferences toward caregiving across demographic

groups, economic circumstances, and constraints, several control variables are included.

---

[2] Table 1.5 in the appendix A shows the results of re-estimating the life satisfaction model using the 10-point-ordinal life satisfaction scale as the dependent variable. The results are similar to the presented findings that care for household and non-household adults are negatively and positively associated to the life satisfaction of retirees, respectively, whereas care for children is not related to the life satisfaction of retirees.

These controls include age, gender, marital status, race, ethnicity, educational level, income level, diary day, region, number of adults in the household, and number of children in the household.[3]

The literature suggests that well-being is related positively to educational level (Gerdtham and Johannesson, 2001; Blanchflower and Oswald, 2004) but negatively to being single (Pinquart, and Sörensen, 2000; Gerdtham and Johannesson, 2001; Helliwell, 2003) and to being male (Alesina et al., 2004; Gerdtham and Johannesson, 2001). There is also a gender difference in life satisfaction between caregivers who provide care to residential parents. Marks et al. (2002) show that care provided by men to residential parents is associated positively with life satisfaction while care provided by women to residential parents is associated negatively with life satisfaction. Blanchflower and Oswald (2004), using data covering the early 1970s through the late 1990s, find that blacks are less happy and report lower life satisfaction than whites (Campbell et al., 1976; Blanchflower and Oswald, 2008; Dolan et al, 2016). However, the racial difference in well-being has narrowed over the past few decades. There also is evidence of variation in well-being among ethnic groups. European Americans are more satisfied with their lives (Oishi, 2001) and report lower levels of depression and anxiety than Asian Americans (Okazaki, 2000). Standard economic theory predicts that income, which is a proxy for financial well-being, positively relates to overall well-being because financial well-being

---

[3] Table 1.6 in the appendix A shows results of re-estimating the life satisfaction model when the number of adults in the household and number of children in the household are excluded from the model. The results are similar to the main findings that care for household adults is negatively associated with the life satisfaction of retirees. However, care for non-household adults and care for children are not related to the life satisfaction of retirees.

is a subcomponent of overall well-being. Income is found to be correlated positively

with life satisfaction (Kahneman & Deaton, 2010; Sacks et al., 2012; Deaton, 2007).

Education information is included as categorical variables with less than high

school category as the reference group. Marital status, gender, race, and ethnicity are

dummy variables. If a respondent is married, the married variable is coded as 1 and as 0

otherwise. If a respondent is female, the female variable is coded as 1 and as 0 otherwise.

If a respondent is white, the white variable is coded as 1 and as 0 otherwise. If a

respondent is Hispanic, the Hispanic variable is coded as 1 and as 0 otherwise. Income is

a categorical variable (less than $10,000 is the reference). A negative relationship

between income level and life satisfaction is expected.

The relation between age and well-being has been studied extensively. A

common finding is that age and well-being have a U-shaped relation, with well-being

being lowest in the 40's and 50's (Blanchflower & Oswald, 2004, 2008; Gerdtham &

Johannesson, 2001). However, a number of studies find different patterns (Frijters &

Beatton, 2012; Lucas & Donnellan, 2007). In this study, age of respondent, number of

adults in the household, and number of children in the household are continuous

variables.

Studies show there also may be a day-of-the-week effect on well-being. People

report more positive emotions and less negative emotions on weekends than on weekdays

(Helliwell and Wang, 2014; Stone et al., 2012). However, Helliwell and Wang (2014)

find no day-of-the-week effect on life satisfaction. In retirement, retirees have more

available time on both weekdays and weekends. Therefore, the day-of-week effect

diminishes for older and retired individuals (Stone et al., 2012). Weekend diary day is a

dummy variable to account for the possible day-of-the-week effect. If a respondent is interviewed on weekends, the weekend variable is coded as 1 and as 0 otherwise.

The same set of control variables also is included in regressions that account for selection into caregiving. It has been well documented that women typically undertake informal caregiving roles more than men. More wives are caregivers to spouses than husbands, and daughters are twice as likely as sons to provide care for parents (Stone, et al., 1987). Pinquart and Sorenson (2006) perform a meta-analysis in which they find that female caregivers typically report higher levels of caregiving tasks, more hours of care provided, and lower levels of well-being than male caregivers. In addition, married children tend to provide less help with caregiving than unmarried children (Stoller, 1983). Stone and Kemper (1989) show descriptively that the likelihood of being a primary caregiver increases with age until an individual reaches the age of 75.

Instrumental Variables

Respondents with higher life satisfaction may be more likely to select into caregiving roles than respondents with lower life satisfaction. Likewise, respondents who engage in caregiving may feel more satisfied with their life than respondents who do not provide care. This presents an endogeneity problem. One way to deal with this is to employ an instrumental variable approach, with state-level data on the cost and availability of purchased care as the instruments. The measures should affect a person's decisions regarding how much caregiving time to give, as purchased care is a substitute for one's own time. However, they should not affect an individual's well-being directly.

The instruments used in the analysis include the percent of nursing facilities visited by an ombudsman, the number of private long-term care insurance policies in effect per 1,000 people aged 40 and above, and the number of people receiving the administration for community living (ACL) congregate meals per 1,000 people aged 65 and above. These data come from "2012 Across The States: Profiles of Long-Term Services and Supports" (Houser et al. 2012). The other instrumental variable, which comes from the publication "2012 Market Survey of Long-Term Care Costs" (Mature Market Institute, 2012), is the Adult Day Services Daily Rate (in $1,000).

Table 1.1 provides descriptive statistics for all the variables used in the analysis. On average, retirees report a life satisfaction score of 7.64. They appear to be reasonably satisfied with their quality of life in general. On average, low, moderate, and high life satisfaction groups report a life satisfaction score of 4.29, 7.42, and 9.72 respectively. The Gallup World Poll uses the same life satisfaction method and reports similar numbers in a survey on life satisfaction in multiple countries (OECD, 2013). 6.92% of retirees report caring for household adults on their diary day, 8.81% report caring for non-household adults, and 7.42% report caring for children.

Regarding the demographic characteristics of the retirees in the sample, the average age is 72, 60.58% are female, 60.63% are married, 87.17% are white, 5.63% are Hispanic, 14.67% have less than high school education, 38.87% attain high school, 21.95% attain some college education, 15.58% attain a college degree, and 8.93% have advanced education. 5.98% of the retirees have an income of less than $10,000. 16.94% have an income between $10,000 and $20,000. 20.89% have an income between $20,000 and $30,000. 11.78% have an income between $30,000 and $40,000. 9.61% have an

income between $40,000 and $50,000. 8.40% have an income between $50,000 and

$60,000. 9.34% have an income between $60,000 and $75,000. 7.64% have an income

between $75,000 and $100,000. 5.60% have an income between $100,000 and $150,000.

3.82% have an income of greater than $150,000. The average number of adults per

retiree household is 1.87, and the average number of children per retiree household is

0.07. 18.62% live in the Northeast, 24.93% live in the Midwest, 38.04% live in the South,

and 18.4% live in the West regions. 29.11% complete the survey during the weekend, and

70.89% complete the survey on a weekday.

Table 1.2 represents how life satisfaction differs depending on retirees'

engagement in different categories of care. From these descriptive statistics, it appears

that retirees who care for children report higher levels of life satisfaction than retirees

who do not, but those who care for either adults outside or inside their households do not

report a different level of life satisfaction than those who do not care for adults.

However, it may be the case that those with high life satisfaction are more willing to

choose to care for children and self-select into such care. Therefore, the model presented

in the next section of this paper accounts for self-selection into caregiving activities.

3.2 Model

Given that the dependent variable has three ordered categories of life satisfaction

ranging from low to moderate to high life satisfaction, an ordered probit model is utilized

to investigate the effects of caregiving on life satisfaction (equation 1). A probit

regression is utilized for each caregiving selection model (equations 2-4). The joint

model estimated via Limited Information Maximum Likelihood (LIML) using the "cmp"

command in STATA is given by:

$$LS_i^* = \alpha_0 + \alpha_1 C_{HAi} + \alpha_2 C_{NAi} + \alpha_3 C_{Ci} + \alpha_4 X_i + a_i \tag{1}$$

$$LS_i = 1 \text{ if } 0 \leq LS_i^* \leq \mu_0$$

$$LS_i = 2 \text{ if } \mu_0 \leq LS_i^* \leq \mu_1$$

$$LS_i = 3 \text{ if } LS_i^* \geq \mu_1$$

$$C_{HAi}^* = \beta_0 + \beta_1 X_i + \beta W_i + b_i \tag{2}$$

$$C_{HAi} = 1 \text{ if } C_{HAi}^* > 0, = 0 \text{ otherwise}$$

$$C_{NAi}^* = \gamma_0 + \gamma_1 X_i + \gamma W_i + c_i \tag{3}$$

$$C_{NAi} = 1 \text{ if } C_{NAi}^* > 0, = 0 \text{ otherwise}$$

$$C_{Ci}^* = \rho_0 + \rho_1 X_i + \rho W_i + d_i \tag{4}$$

$$C_{Ci} = 1 \text{ if } C_{Ci}^* > 0, = 0 \text{ otherwise}$$

Equation (1) is an ordered probit model in which LS_i^* is the latent variable behind

the observed LS_i. LS_i is life satisfaction (a 10-point-ordinal scale grouped into 3

categories: low, moderate, and high for person i). C_{HAi}, C_{NAi}, and C_{Ci} are indicators for

whether the person cares for a household adult, a non-household adult, or a child,

respectively, on the diary day. X_i is a vector of person-level characteristics with a_i being

the error term and the alphas being the coefficients to be estimated. The model estimates

the probability that person i will report each level of life satisfaction.

Equations (2), (3), and (4) are probit models where C_{HAi}^*, C_{NAi}^*, and C_{Ci}^* are the

relevant latent variables. W is the vector of instrumental variables while b_i, c_i, and d_i are

the errors to be estimated. The betas, gammas, and rhos are the parameters to be

estimated. Estimating these equations jointly improves the efficiency of the estimates

over any two-stage instrumental variables approach. Kalenkoski and Oumtrakool (2017)

estimate a similar model to account for selection into caregiving.

4. Results

Table 1.3 reports the marginal effects of each of the different types of caregiving

activities on the probability of reporting each level of life satisfaction of retirees. Caring

for household adults increases the probability of the person reporting low life satisfaction

by 0.44 and decreases the probability of the person reporting high life satisfaction by

0.32. Caring for non-household adults decreases the probability that a person reports low

and moderate life satisfaction by 0.19 and 0.16, respectively, and increases the

probability that a person reports high life satisfaction by 0.35. Caring for children does

not appear to significantly affect life satisfaction.

The relationships between several of the control variables and life satisfaction

also are significant. Being female compared to male decreases the probability that a

person reports low life satisfaction by 0.07, and increases the probability that he or she

reports high life satisfaction by 0.08. Having an income between $20,000 and $30,000

compared to having income less than $10,000 decreases the probability that a person

reports low life satisfaction by 0.08, and increases the probability that a person reports high life satisfaction by 0.11. Having an income between $60,000 and $75,000 compared to having income less than $10,000 decreases the probability that a person reports low life satisfaction by 0.08, and increases the probability that a person reports high life satisfaction by 0.11. Having an income between $100,000 and $150,000 compared to having income less than $10,000 decreases the probability that a person reports low life satisfaction by 0.08. Marital status, race, ethnicity, educational attainment, number of adults, number of children in the household, region, and diary day are not statistically significant.

Table 1.4 in the appendix A shows the estimated coefficients and standard errors for the caregiving selection probit models. In each of these probit models, there are instruments that are highly individually significant. The models need at least three instrumental variables for identification. In addition, considering the adjusted Wald test results, the entire set of instruments is highly jointly significant in all models[4].

---

[4] To determine whether the instruments are valid, two additional tests are performed. The instruments are statistically significant in the caregiving selection equations and pass the overidentification test. Results are available upon request.

5. Conclusion and Discussion

This paper uses data from the 2012 ATUS and WBM to examine how caring for adults and children affects the overall well-being of retired individuals providing care for others. The results show that caring for household adults is associated with a lower level of life satisfaction while caring for non-household adults is related to a higher level of life satisfaction. This is consistent with the idea that caregiving for those outside of one's household is more of a voluntary action than caregiving for those inside one's household. Voluntarily providing care may provide utility, resulting in an increased overall quality of life. However, caring for children does not appear to significantly affect life satisfaction. However, the finding is different from that of Marks et al. (2002) who find that men who provide nonresidential care to a parent have lower life satisfaction and that men who provide co-resident care for a parent have higher life satisfaction compared to non-caregivng men. This study also suggests that income levels are related positively to the level of life satisfaction. However, the effect is not consistent across all income levels.

It is important to understand not only which types of caregiving may affect life satisfaction negatively, but also which types may help improve well-being. With this information, resources or policies which could lift some of the responsibility of caring for household adults from retirees would likely improve their well-being. For example, Adult Day Service (ADS) centers, a community-based system of services for older adults, offer a variety of services for both care recipients and their caregivers. In addition to care services, they also may offer educational programs, support groups, and respite services, which can help relieve the care responsibilities of unpaid caregivers for short periods of time. Joining the ADS is related to caregivers' overall well-being and lower levels of

burden and stress (Sussman and Regehr, 2009; Valadez et al., 2005; Molzahn et al., 2009). Using a meta-analysis, Sörensen et al. (2002) conclude that the use of support groups and respite services reduces caregiver burden and depression and improves well-being. Educational programs have been shown to provide caregivers with information that improves their skill in providing care while helping them to develop coping strategies to better manage the related negative psychological stress (Toseland et al., 2001). Coping strategies have been shown to affect the life satisfaction of caregivers positively (Wells et al., 2005).

This study extends the work of Kalenkoski and Oumtrakool (2017). While they focus on experience well-being and find that most caregiving has negative impacts on the emotional well-being of retired caregivers, this paper focuses on evaluative well-being. Considering the two findings together suggests that, to get a complete picture of how caregiving affects subjective well-being, a comprehensive investigation that explores all components of subjective well-being is required. While all caregivers are experiencing negative emotional impacts from caregiving, those caring for household adults report lower levels of life satisfaction, while those caring for non-household adults report higher levels of life satisfaction.

Financial planners' main goals are to help their clients to maximize their expected lifetime utility. Therefore, it is important for planners to understand and plan for life events or circumstances at each stage of the life cycle that could affect their clients' well-being negatively. Providing care is one of those circumstances because it can be physically exhausting and emotionally draining for retirees. For this reason, it is important for a financial planner to understand the effects of such activities. Financial

planners should help clients realize the possibility that they may need to provide care for

household adults and plan ahead to delegate or lessen the responsibility. If the

responsibility of providing care is inevitable during retirement, financial planners may

suggest that clients also engage in other activities that may lead to increased satisfaction

and well-being, such as volunteering. Butrica and Schaner (2005) find that retirees who

engage in both caregiving and volunteering are more to be satisfied with their retirement.

This could potentially enhance their overall happiness.
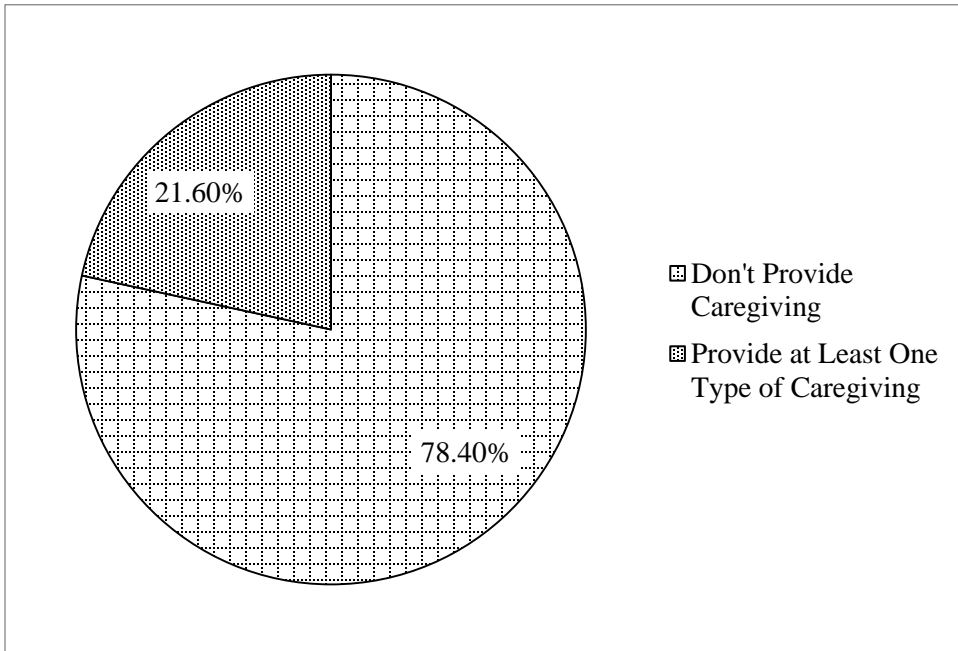
Figure 1. Percentage of Retirees Providing Caregiving
2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Number
of observations = 1,932. Survey weights were used.
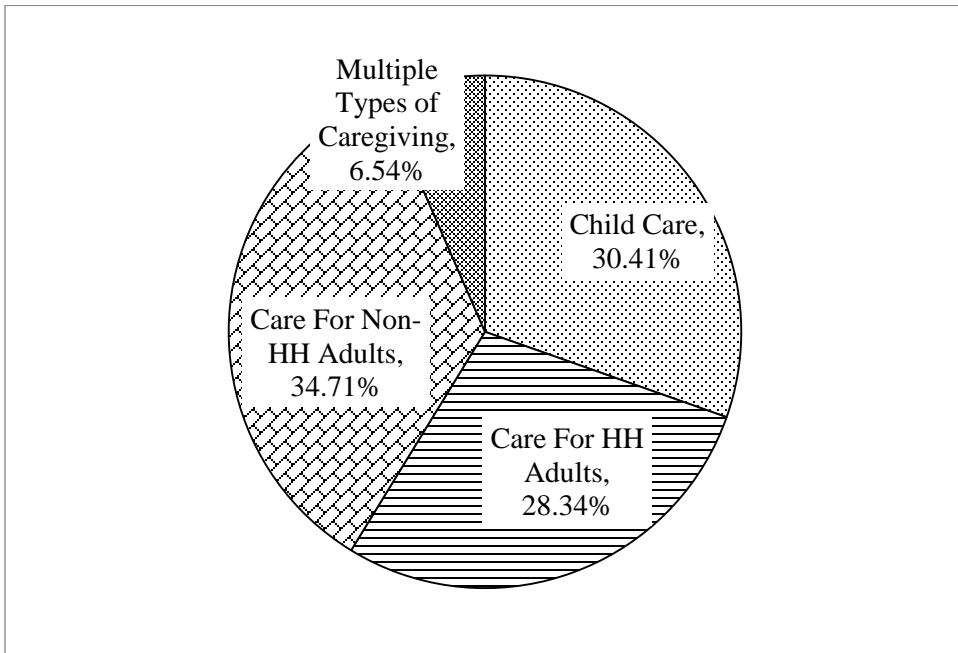
Figure 2. Types of Caregiving Provided by Retirees
2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Number
of observations = 362. Survey weights were used.

Table 1.1: Descriptive Statistics for the Sample of Retirees

Dependent variables	Mean	Std. Error
Life Satisfaction	7.6403	0.0589
Low life satisfaction (LS: 0-5)	4.2914	0.0835
Moderate life satisfaction (LS: 6-8)	7.4201	0.0319
High life satisfaction (LS: 9-10)	9.7236	0.0211
Independent variables		
Caregiving		
Care for household adults	0.0692	0.0083
Care for non-household adults	0.0881	0.0085
Child care	0.0742	0.0076
Age	71.9942	0.2341
Female	0.6058	0.0142
Married	0.6063	0.0132
White	0.8717	0.0088
Hispanic	0.0563	0.0062
Education		
Less than high school	0.1467	0.0098
High school	0.3887	0.0142
Some college	0.2195	0.0118
College	0.1558	0.0103
Advance education	0.0893	0.0077
Income Level		
Income Less than $10,000	0.0598	0.0062
Income $10,000-$20,000	0.1694	0.0098
Income $20,000-$30,000	0.2089	0.0116
Income $30,000-$40,000	0.1178	0.0094
Income $40,000-$50,000	0.0961	0.0086
Income $50,000-$60,000	0.0840	0.0084
Income $60,000-$75,000	0.0934	0.0090
Income $75,000-$100,000	0.0764	0.0078
Income $100,000-$150,000	0.0560	0.0073
Income Greater Than $150,000	0.0382	0.0058
Number of adults in the household	1.8723	0.0235
Number of children in the household	0.0671	0.0088
Region		
Northeast	0.1862	0.0112
Midwest	0.2493	0.0123
South	0.3804	0.0140
West	0.1841	0.0111

Table 1.1: Descriptive Statistics for the Sample of Retirees (continued)

Dependent variables	Mean	Std. Error
Diary day		
Weekend	0.2911	0.0109
Weekday	0.7089	0.0109
Instrumental variables	**Mean**	**Std. Error**
Adult Day Services Daily Rate (in $1,000)[1]	$0.0679	0.0004
Number of Private Long-Term Care Insurance Policies in Effect, per 1000 Age 40 and Above[2]	45.5299	0.6987
Number of People Receiving the Administration for Community Living (ACL) Congregate Meals[2]	42.7074	0.8249
Percent of Nursing Facilities Visited by Ombudsman at Least Quarterly[2]	0.7673	0.7006

2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Number of observations is 1,932. Survey weights were used. Sources: [1] 2012 Market Survey of Long-Term Care Costs. [2] 2012 Across The States: Profiles of Long-Term Services and Supports.

Table 1.2: Retirees' Average Life Satisfaction Scores by Caregiving Activities

Variables	Care for HH-adults	Do not care for HH-adults	Sig.	Care for non-HH-adults	Do not care for non-HH-adults	Sig.	Care for children	Do not care for children	Sig.
Life satisfaction	7.7113	7.6350		7.6423	7.6401		7.5704	7.6459	
Low Life satisfaction	4.5854	4.2689		4.4105	4.2781		4.2202	4.2988	
Moderate Life satisfaction	7.3367	7.4259		7.5243	7.4109		7.3988	7.4215	
High Life satisfaction	9.7385	9.7224		9.7079	9.7252		9.8561	9.7121	***

2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Number of observations is 1,932. Survey weights were used.
* Well-being score is statistically different across groups at the 90% confidence level
** Well-being score is statistically different across groups at the 95% confidence level
*** Well-being score is statistically different across groups at the 99% confidence level

Table 1.3: Effects of Caregiving on Retirees' Life Satisfaction

Variables	Low Life Satisfaction		Moderate Life Satisfaction		High Life Satisfaction	
	Marginal Effect	Sig.	Marginal Effect	Sig.	Marginal Effect	Sig.
Caregiving						
Care of HH Adults	0.4441	***	-0.1238		-0.3203	***
	(0.1304)		(0.0868)		(0.0594)	
Care of Non-HH Adults	-0.1863	***	-0.1641	*	0.3504	***
	(0.0560)		(0.0862)		(0.1329)	
Care of HH & Non-HH Children	-0.0925		-0.0356		0.1281	
	(0.1382)		(0.0711)		(0.2077)	
Age	0.0005		0.0001		-0.0006	
	(0.0012)		(0.0004)		(0.0016)	
Female (vs. Male)	-0.0674	***	-0.0175		0.0849	***
	(0.0203)		(0.0108)		(0.0243)	
Married (vs. Unmarried)	-0.0350		-0.0090		0.0440	
	(0.0260)		(0.0076)		(0.0317)	
White (vs. Non-White)	0.0300		0.0092		-0.0392	
	(0.0227)		(0.0086)		(0.0300)	
Hispanic (vs. Non-Hispanic)	-0.0183		-0.0053		0.0237	
	(0.0473)		(0.0158)		(0.0629)	
Education (vs. Less than High School)						
High School	0.0353		0.0081		-0.0433	
	(0.0323)		(0.0078)		(0.0383)	
Some College	0.0440		0.0094		-0.0534	
	(0.0336)		(0.0088)		(0.0397)	
College	0.0160		0.0038		-0.0198	
	(0.0360)		(0.0084)		(0.0440)	
Advanced Education	0.0262		0.0057		-0.0318	
	(0.0409)		(0.0081)		(0.0480)	
Income Level (vs. Less than $10,000)						
Income $10,000-$20,000	-0.0268		-0.0084		0.0352	
	(0.0369)		(0.0143)		(0.0505)	
Income $20,000-$30,000	-0.0769	**	-0.0316		0.1085	**
	(0.0329)		(0.0231)		(0.0523)	
Income $30,000-$40,000	-0.0361		-0.0118		0.0479	
	(0.0391)		(0.0167)		(0.0548)	
Income $40,000-$50,000	-0.0439		-0.0153		0.0591	
	(0.0413)		(0.0204)		(0.0605)	
Income $50,000-$60,000	-0.0388		-0.0131		0.0519	
	(0.0439)		(0.0193)		(0.0622)	
Income $60,000-$75,000	-0.0780	**	-0.0330		0.1110	*
	(0.0387)		(0.0267)		(0.0621)	

Table 1.3: Effects of Caregiving on Retirees' Life Satisfaction (continued)

Variables	Low Life Satisfaction		Moderate Life Satisfaction		High Life Satisfaction	
	Marginal Effect	Sig.	Marginal Effect	Sig.	Marginal Effect	Sig.
Income $75,000-$100,000	0.0022		0.0006		-0.0027	
	(0.0481)		(0.0122)		(0.0603)	
Income $100,000-$150,000	-0.0789	*	-0.0330		0.1120	
	(0.0463)		(0.0308)		(0.0741)	
Income Greater Than $150,000	-0.0145		-0.0042		0.0187	
	(0.0555)		(0.0179)		(0.0733)	
Number of Adult in the Household	-0.0293		-0.0077		0.0370	
	(0.0185)		(0.0062)		(0.0229)	
Number of Children in the Household	0.0506		0.0132		-0.0638	
	(0.0455)		(0.0121)		(0.0552)	
Region (vs. West)						
Notrh East	0.0215		0.0050		-0.0265	
	(0.0286)		(0.0063)		(0.0342)	
Mid West	0.0452		0.0094		-0.0546	*
	(0.0287)		(0.0078)		(0.0331)	
South	0.0316		0.0076		-0.0393	
	(0.0244)		(0.0071)		(0.0298)	
Weekend diary day (vs. Weekday)	0.0042		0.0011		-0.0053	
	(0.0167)		(0.0043)		(0.0210)	

2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Standard errors are in parentheses. Survey weights are used. Number of observations = 1,932.
* indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Instrumental variables are from 2012 Market Survey of Long-Term Care Costs. 2012 Across The States: Profiles of Long-Term Services and Supports.

References

Alesina, Alberto; Di Tella, Rafael; and MacCulloch, Robert (2004). "Inequality and happiness: are Europeans and Americans different?," *Journal of Public Economics*, Vol. 88, No. 9, pp. 2009-2042.

Andrews, Frank M., and Withey, Stephen B. (1976). "Social Indicators of Well-Being," New York: Plenum Press.

Averina, Maria, Odd Nilssen, Tormod Brenn, Jan Brox, Vadim L. Arkhipovsky, and Alexei G. Kalinin. (2005). "Social and lifestyle determinants of depression, anxiety, sleeping disorders and self-evaluated quality of life in Russia." *Social Psychiatry and Psychiatric Epidemiology*, *40*(7), pp. 511-518.

Blanchflower, David G.; and Oswald, Andrew J. (2004). "Well-being over time in Britain and the USA," *Journal of public economics*, 88(7), 1359-1386.

_____ (2008). "Is well-being U-shaped over the life cycle?" *Social science & medicine*, Vol. 66, No. 8, pp. 1733-1749.

Becker, Gary S. (1965). "A Theory of the Allocation of Time," *The Economic Journal*, 75(299), 493-517.

Borg, Christel, and Ingalill R. Hallberg (2006). "Life satisfaction among informal caregivers in comparison with non-caregivers." *Scandinavian journal of caring sciences*, *20*(4), pp. 427-438.

Bowers, Bonita F.; and Myers, Barbara J. (1999). "Grandmothers providing care for grandchildren: Consequences of various levels of caregiving." *Family Relations* Vol. 48, pp. 303-311.

Brown, Stephanie L.; Nesse, Randolph M.; Vinokur, Amiram D.; and Smith, Dylan M. (2003). "Providing social support may be more beneficial than receiving it results from a prospective study of mortality," *Psychological Science*, Vol. 14, No. 4, pp. 320-327.

Butrica, Barbara A.; Goldwyn, Joshua H.; and Johnson, Richard W. (2005). "Understanding Expenditure Patterns in Retirement," *Center for Retirement Research Working Paper* No. 2005-3.

Butrica, Barbara A. and Mermin, Gordon B. (2006). "Annuitized Wealth and Consumption at Older Ages," *Center for Retirement Research Working Paper* No. 2006-26.

Butrica, Barbara A. and Schaner, Simone G. (2005). "Satisfaction and Engagement in Retirement," *Perspectives on Productive Aging,* No. 2, Urban Institute, Washington, DC.

Campell, Angus; Converse, Philip E.; and Rodgers, Willard L. (1976). "The Quality of American Life: Perceptions, Evaluations, and Satisfactions," New York: Russell Sage Foundation.

Cantril, Hadley (1965). "The pattern of human concerns". Rutgers University Press, New Brunswick, NJ

Chan, Angelique; Malhotra, Chetna; Malhotra, Rahul; and Rush, Augustus J.; and Østbye, Truls (2013). "Health impacts of caregiving for older adults with functional limitations: results from the Singapore survey on informal caregiving," *Journal of Aging and Health*, Vol. *25, No.* 6, pp.998–1012.

Chari, Amalavoyal V.; Engberg, John; Ray, Kristin N.; and Mehrotra, Ateev (2015). "The Opportunity Costs of Informal Elder-Care in the United States: New Estimates from the American Time Use Survey." *Health services research*, Vol 50. No. 3, pp. 871-882.

Csikszentmihalyi, Mihaly (1990). "Flow: The Psychology of Optimal Experience," New York: HarperCollins.

Deaton, Angus (2007). "Income, aging, health and wellbeing around the world: Evidence from the Gallup World Poll." *Journal of Economic Perspectives*, Vol. 22, pp. 53-72.

Depp, Colin A., and Dilip V. Jeste (2009). "Definitions and predictors of successful aging: a comprehensive review of larger quantitative studies." *American Association for Geriatric Psychiatry* 14(1), pp. 6-20.

Diener, Ed; and Suh EM. (1998). "Subjective well-being and age: An international analysis," *Annual review of gerontology and geriatrics*, Vol. 17, pp. 304-324.

Dolan, Paul; Kudrna, Laura; and Stone, Arthur 920160. "The measure matters: an investigation of evaluative and experience-based measures of wellbeing in time use data." *Social Indicators Research*, pp. 1-17.

Ellis, Renee R. and Simmons, Tavia (2014). "Coresident Grandparents and Their Grandchildren: 2012," https://www.census.gov/content/dam/Census/library/publications/2014/demo/p20-576.pdf. Accessed 9/06/15.

Fawcett, James T (1988). "The value of children and the transition to parenthood." *Marriage & Family Review* Vol.12, No. 3-4, pp.11-34.

Forsberg-Warleby, Gunilla; Moller, Anders; and Blomstrand, Christian (2004). "Life satisfaction in spouses of patients with stroke during the first year after stroke." *Journal of Rehabilitation Medicine*, 36(1), 4-11.

Frey, Bruno S.; and Stutzer, Alois (2002). "What can economists learn from happiness research?," *Journal of Economic literature*, Vol. 40, No. 2, pp. 402-435.

Frijters, Paul; and Beatton, Tony. (2012). "The mystery of the U-shaped relationship between happiness and age." *Journal of Economic Behavior & Organization*, Vol. 82, No. 2-3, pp.525-542.

Gerdtham, Ulf-G; and Johannesson, Magnus (2001). "The relationship between happiness, health, and socio-economic factors: results based on Swedish microdata." *The Journal of Socio-Economics*, Vol. 30, No. 6, pp. 553-557.

Greenwald & Associates (2015). "Caregiving in the U.S. 2015," *National Alliance for Caregiving and the AARP Public Policy Institute*.

Haley, William E.; LaMonde, Laurie A.; Han, Beth; Narramore, Stephanie; and Schonwetter, Ronald (2001). "Family caregiving in hospice: effects on psychological and health functioning among spousal caregivers of hospice patients with lung cancer or dementia." *Hospice Journal*.

Ho, Suzanne C.; Chan, Alfred; Woo, Jean; Chong, Portia; and Sham, Aprille (2009). "Impact of Caregiving on Health and Quality of Life: A Comparative Population-Based Study of Caregivers for Elderly Persons and Noncaregivers," *Journals of Gerontology - Series A Biological Sciences and Medical Sciences*, Vol. *64, No.* 8, pp.873–879.

Houser, Ari; Fox-Grage, Wendy; and Ujvari, Kathleen (2012). "2012 Across The States: Profiles of Long-Term Services and Supports," http://www.aarp.org/home-garden/livable-communities/info-09-2012/across-the-states-2012-profiles-of-long-term-services-supports-AARP-ppi-ltc.html. Accessed 8/19/14.

Helliwell, John F. (2003). "How's life? Combining individual and national variables to explain subjective well-being," *Economic Modelling*, Vol. 20, No. 2, pp. 331-360.

Helliwell, John F.; and Wang, Shun. (2014). "Weekends and subjective well-being." *Social indicators research*. Vol. 116, No. 2, pp. 389-407.

Hurd, Michael and Rohwedder, Susann (2003). "The Retirement-Consumption puzzle: Anticipated and Actual Declines in Spending at Retirement," *NBER Working Paper* No. 9586.

Janssen, Ian (2016). "Estimating Whether Replacing Time in Active Outdoor Play and Sedentary Video Games With Active Video Games Influences Youth's Mental Health". *Journal of Adolescent Health*, *59*(5), pp. 517-522.

Johnson, Richard W. and Simone G. Schaner (2005). "Many Older Americans Engage in Caregiving Activities," *The Retirement Project: Perspectives on Productive Aging*, No. 3, pp. 1-5.

Kahneman, Daniel; and Deaton. Angus. (2010). ""High income improves evaluation of life but not emotional well-being," *Proceedings of the national academy of sciences*, Vol. 107, No. 38, pp. 16489-16493.

Kalenkoski, Charlene M. (2017). "*Caregiving by Older Adults: Gender Differences in Well-being*," in Gender and Time Use in a Global Context: The Economics of Employment and Unpaid Labor, edited by Rachel Connelly and Ebru Kangar, Palgrave Macmillan, pp. 271-282.

Kalenkoski, Charlene M., & Oumtrakool, Eakamon (2014). "How Retirees Spend Their Time: Helping Client Set Realistic Income Goals," *Journal of Financial Planning*, Vol. 27, No. 10, pp. 48-53.

_____ (2017). "The caregiving responsibilities of retirees: what are they and how do they affect retirees' well-being?." *Applied Economics*, Vol. *49, No.* 13, pp. 1298-1310.

Kapteyn, Arie; Lee, Jinkook; Tassot, Caroline; Vonkova, Hana; and Zamarro, Gema (2015). "Dimensions of subjective well-being," *Social indicators research*, Vol. 123, No. 3, pp. 625-660.

Levine, Phillip B.; Mitchell, Olivia S.; and Moore, James F. (2000). "Women on the verge of retirement: predictors of retiree wellbeing," In: Mitchell, O.S., Brett Hammond, P., Rappaport, A.M. (Eds.), *Forecasting Retirement Needs and Retirement Wealth*. University of Pennsylvania Press, Philadelphia, pp. 167–195.

Lucas, Richard E.; and Donnellan, M. Brent. (2007). "How stable is happiness? Using the STARTS model to estimate the stability of life satisfaction." *Journal of research in personality*, Vol. 41, No. 5, pp. 1091-1098.

Malhotra, Chetna; Malhotra, Rahul; Ostbye, Truls; Matchar, David; and Chan, Angelique (2012). "Depressive symptoms among informal caregivers of older adults: insights from the Singapore Survey on Informal Caregiving," *International Psychogeriatrics*, Vol. 24, No. 8, pp. 1335-1346.

Mature Market Institute (2012). "Market Survey of Long-Term Care Costs,"

https://www.metlife.com/assets/cao/mmi/publications/studies/2012/studies/mmi-2012-market-survey-long-term-care-costs.pdf. Accessed 8/18/14.

Marks, Nadine F.; Lambert, James D.; and Choi, Heejeong (2002). "Transitions to Caregiving, Gender, and Psychological Well-Being: A Prospective US National Study," *Journal of Marriage and Family*, Vol. 64. No. 3, pp. 657-667.

McConnel, Charles E. and Deljavan, Firooz (1983). "Consumption Patterns of the Retired Household," *Journal of Gerontology* 38(4): 480-490.

Mitchell, Olivia S. and McCarthy, David (2002). "Annuities for an ageing world," *NBER Working Paper* No. 9092.

Molzahn, Anita E.; Gallagher, Elaine; and McNulty, Vicki (2009). "Quality of Life Associated with Adult Day Centers," *Journal of Gerontological Nursing,* Vol. 35, No. 8, pp. 37-46.

Musil, Carol M.; Gordon, Nahida L.; Warner, Camille B.; Zauszniewski, Jaclene A.; Standing, Theresa; and Wykle, May. (2010). "Grandmothers and caregiving to grandchildren: Continuity, change, and outcomes over 24 months." *The Gerontologist*, Vol. 51, No. 1, pp. 86-100.

National Research Council (2012). "The Subjective Well-Being Module of the American Time Use Survey: Assessment for Its Continuation. Panel on Measuring Subjective Well-Being in a Policy-Relevant Framework, "Committee on National Statistics, Division of Behavioral and Social Sciences and Education. Washington, DC: *The National Academies Press*.

OECD (2013), "*How's Life? 2013: Measuring Well-being*," *OECD Publishing*, Paris.

Oishi, Shigehiro (2001). "Culture and memory for emotional experiences: on-line vs. retrospective judgments of subjective well-being," *Dissertation Abstracts International*, Vol. 61(10-B), 5625.

Okazaki, Sumie (2000). "Asian American and White American Differences on Affective Distress Symptoms Do Symptom Reports Differ Across Reporting Methods?," *Journal of Cross-Cultural Psychology*, Vol. 31, No. 5, pp. 603-625.

Oswald, Andrew J.; and Powdthavee, Nattavudh (2008). "Does happiness adapt? A longitudinal study of disability with implications for economists and judges," *Journal of public economics*, Vol. 92, No. 5, pp. 1061-1077.

Parker, Kim; and Horowitz, Juliana M. (2015). "Family Support in Graying Societies How Americans, Germans and Italians Are Coping with and Aging Population," *Pew Research Center*

Piferi, Rachel L.; and Lawler, Kathleen A. (2006). "Social support and ambulatory blood pressure: An examination of both receiving and giving," *International Journal of Psychophysiology*, Vol. 62, No. 2, pp. 328-336.

Pinquart, Martin, and Silvia Sörensen (2000). "Influences of socioeconomic status, social network, and competence on subjective well-being in later life: A meta-analysis." *Psychology And Aging*. Vol. 15, No. 2, pp. 187-224.

_____ (2003). "Differences between Caregivers and Noncaregivers in Psychological Health and Physical Health: A Meta-Analysis," *Psychology and Aging*, Vol. 18, No. 2, pp. 250-267.

_____ (2004). "Associations of Caregiver Stressors and Uplifts with Subjective Well-being and Depressive Mood: A Meta-analytic Comparison," *Aging and Mental Health*, Vol. 8, No. 5, pp. 438-449.

_____(2006). "Gender differences in caregiver stressors, social resources, and health: An updated meta-analysis." Vol. 61, No. 1, pp. 33-P45.

Pollmann-Schult, Matthias (2014). "Parenthood and Life Satisfaction: Why Don't Children Make People Happy?" *Journal of Marriage and Family*, Vol. 76, No. 2, pp. 319-336.

Sacks, Daniel W.; Stevenson, Betsey; and Wolfers, Justin. (2012). "The new stylized facts about income and subjective well-being," *Emotion*, Vol. 12, No. 6, pp. 1181-1187.

Scharlach, Andrew E. (1994). "Caregiving and Employment: Competing or Complementary Roles?," *Gerontologist,* Vol 38, pp. 378-385.

Schulz, Richard; Beach, Scott R.; Cook, Thomas B.; Martire, Lynn M.; Tomlinson, Jennifer M.; and Monin, Joan K. (2012). "Predictors and consequences of perceived lack of choice in becoming an informal caregiver," *Aging & mental health*, Vol. 16, No. 6, pp. 712-721.

Soto, Christopher J.; and Luhmann, Maike (2013). "Who can buy happiness? Personality traits moderate the effects of stable income differences and income fluctuations on life satisfaction." *Social Psychological and Personality Science*, Vol. 4, No. 1, pp. 46-53.

Sörensen, Silvia; Pinquart, Martin; and Duberstein, Paul (2002). "How effective are interventions with caregivers? An updated meta-analysis," *The gerontologist*, Vol. 42, No. 3, pp. 356-372.

Stephens, Melvin; and Unayama, Takashi (2012). "The Impact of Retirement on Household Consumption in Japan," *Journal of the Japanese and International Economies 26*(1): 62-83.

Stone, Robyn; Cafferata, Gail Lee; and Sangl, Judith. (1987). "Caregivers of the frail elderly: A national profile." *The Gerontologist*, Vol. 27, No. 5, pp. 616-626.

Stone, Arthur A., and Mackie, Christopher. (Eds.). (2014). "Subjective well-being: Measuring happiness, suffering, and other dimensions of experience," *National Academies Press*.

Stone, Arthur A.; Schneider, Stefan; and Harter, James K. (2012). "Day-of-week mood patterns in the United States: On the existence of 'Blue Monday','Thank God it's Friday'and weekend effects," *The Journal of Positive Psychology*, Vol. 7, No. 4, pp. 306-314.

Stone, Arthur, and Shiffman, Saul (1994). "Ecological Momentary Assessment in Behavioral Medicine," *Annals of Behavioral Medicine*, Vol. 16, pp. 199-202.

Sussman, Tamara; and Regehr, Cheryl (2009). "The influence of community-based services on the burden of spouses caring for their partners with dementia," *Health & Social Work*, Vol. 34, No. 1, pp. 29-39.

Szinovacz, Maximiliane E.; DeViney, Stanley; and Atkinson, Maxine P. (1999). "Effects of surrogate parenting on grandparents' well-being." *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, Vol. 54, No. 6, pp. 376-S388.

Tate, Robert B., Leedine Lah, and T. Edward Cuddy (2003). "Definition of successful aging by elderly Canadian males: The Manitoba follow-up study." *The Gerontologist*, *43*(5), pp. 735-744.

Toseland, Ronald W.; McCallion, Philip; Smith, Tamara; Huck, Steve; Bourgeois, Pauline; and Garstka, Teri A. (2001). "Health education groups for caregivers in an HMO," *Journal of clinical psychology*, Vol. 57, No.4, pp. 551-570.

U.S. Bureau of Labor Statistics (2015). "Unpaid Eldercare in the United States – 2011-2012 Data from the American Time Use Survey," News Release 9/18/13.

U.S. Census Bureau (2015). "2015 American Community Survey 1-Year Estimates"

https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk Accessed 5/11/17.

Valadez, Albert; Lumadue, Christine; Gutierrez, Bibiana; and de Vries-Kell, Sabina (2005). "Family caregivers of impoverished Mexican-American women: The perceived impact of adult day care centers," *Families in Society: The Journal of Contemporary Social Services*, Vol. 86, No. 3, pp. 384-392.

Visser-Meily, Anne; Post, Marcel; Schepers, Vera; and Lindeman, Eline (2005). "Spouses' quality of life 1 year after stroke: prediction at the start of clinical rehabilitation." *Cerebrovascular Diseases* Vol. 20, No. 6, pp. 443-448.

Walker, Alexis J.; and Allen, Katherine R. (1991). "Relationships between Caregiving Daughters and Their Elderly Mothers," *Gerontologist,* Vol. 31, No. 3, pp. 389-39.

Ward-Batts, Jennifer (2008). "Household Production and Consumption Before versus After Retirement: Evidence from Time Diary Data" in *How Do We Spend Our Time? Evidence from the American Time Use Survey*, edited by Jean Kimmel, Upjohn Institute for Employment Research, pp. 81-105.

Wells, R., Dywan, J., and Dumas, J. (2005). "Life satisfaction and distress in family caregivers as related to specific behavioural changes after traumatic brain injury." *Brain Injury*, Vol. 19, No. 13, pp. 1105-1115.

Winter, Katherine H., Erin D. Bouldin, and Elena M. Andresen. (2010). "Lack of choice in caregiving decision and caregiver risk of stress", *Preventing Chronic Disease*, Vol. 7, No. 2:A41. http://www.cdc.gov/pcd/issues/2010/mar/09_0037.htm. Accessed 06/12/2017.

Appendix A

Table 1.4: Caregiving Selection Probit Models

Variables	Care of HH Adults		Care of Non-HH Adults		Child Care	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Age	-0.0038		-0.0125	*	-0.0145	**
Female	0.0737		-0.1259		0.0728	
Married	0.5394	***	0.0540		0.2420	*
White	-0.4236	**	0.1069		0.0921	
Hispanic	-0.2531		-0.0026		0.7111	***
Education (vs. Less than High School)						
High school	-0.2362		0.4798	***	0.6387	***
Some college	-0.1100		0.4283	**	0.2433	
College	-0.4557	*	-0.0574		0.4545	**
Advance education	-0.4415		0.1038		0.4057	*
Income Level (vs. Less than $10,000)						
Income $10,000-$20,000	0.4831		0.0569		-0.2841	
Income $20,000-$30,000	0.4441		0.1514		0.0522	
Income $30,000-$40,000	0.0428		-0.0802		0.2655	
Income $40,000-$50,000	0.4732		0.3520		0.1842	
Income $50,000-$60,000	0.2626		0.2883		0.1307	
Income $60,000-$75,000	0.1701		0.2461		0.4180	
Income $75,000-$100,000	0.5481		0.5949	*	0.3474	
Income $100,000-$150,000	0.3270		0.6593	*	0.0645	
Income Greater Than $150,000	0.2233		0.4297		0.2332	
Number of adults in the household	0.3693	***	-0.2383	**	-0.3366	***
Number of children in the household	-0.7374	***	-0.3115	*	0.9264	***
Region (vs. West)						
Northeast	-0.4431	**	0.0438		-0.0303	
Midwest	-0.7211	***	0.0093		0.3962	*
South	-0.5816	**	-0.2157		0.1903	
Weekend diary day (vs. Weekday)	-0.1115		-0.0730		-0.2514	**

Table 1.4: Caregiving Selection Probit Models (Continued)

Variables	Care of HH Adults		Care of Non-HH Adults		Child Care	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Instrumental variables						
Adult Day Services Daily Rate (in $1,000)	-8.3214		-11.5154	***	3.8187	
Number of Private Long-Term Care Insurance Policies in Effect, per 1000 Age 40 and Above	-0.0144	***	0.0010		-0.0013	
Number of People Receiving the Administration for Community Living (ACL) Congregate Meals	0.0019		-0.0040	**	-0.0067	***
Percent of Nursing Facilities Visited by Ombudsman at Least Quarterly	-0.0086	***	0.0004		-0.0038	
Adjusted Wald test for the joint significant of the instruments						
Prob > F	0.0009	***	0.0129	**	0.0434	**

2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Instrumental variables are from 2012 Market Survey of Long-Term Care Costs. 2012 Across The States: Profiles of Long-Term Services and Supports. Number of observations = 1,932. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Survey weights were used.

Table 1.5: Effects of Caregiving on Retirees' Life Satisfaction

Variables	LS = 0 Marginal Effect	Sig.	LS = 1 Marginal Effect	Sig.	LS = 2 Marginal Effect	Sig.	LS = 3 Marginal Effect	Sig.	LS = 4 Marginal Effect	Sig.	LS = 5 Marginal Effect	Sig.	LS = 6 Marginal Effect	Sig.	LS = 7 Marginal Effect	Sig.	LS = 8 Marginal Effect	Sig.	LS = 9 Marginal Effect	Sig.	LS = 10 Marginal Effect	sig.
Caregiving																						
Care of HH Adults	0.1835		0.0144		0.0336	**	0.0537	***	0.0429	***	0.0825	***	0.0027		-0.0193		-0.1086	**	-0.0550	***	-0.2304	***
	(0.1188)		(0.0094)		(0.0152)		(0.0180)		(0.0112)		(0.0284)		(0.0174)		(0.0230)		(0.0455)		(0.0145)		(0.0478)	
Care of Non-HH Adults	-0.0372	**	-0.0050	*	-0.0133	***	-0.0271	***	-0.0295	***	-0.1244	***	-0.0549	***	-0.0633	***	-0.0882	**	-0.0010		0.4439	***
	(0.0165)		(0.0029)		(0.0048)		(0.0073)		(0.0069)		(0.0179)		(0.0101)		(0.0139)		(0.0392)		(0.0159)		(0.0973)	
Care of HH & Non-HH Children	-0.0190		-0.0022		-0.0057		-0.0109		-0.0108		-0.0367		-0.0119		-0.0098		0.0024		0.0102		0.0944	
	(0.0242)		(0.0032)		(0.0079)		(0.0146)		(0.0149)		(0.0532)		(0.0187)		(0.0171)		(0.0074)		(0.0126)		(0.1430)	
Age	-0.0001		0.0000		0.0000		-0.0001		-0.0001		-0.0002		-0.0001		0.0000		0.0000		0.0001		0.0004	
	(0.0003)		(0.0000)		(0.0001)		(0.0002)		(0.0002)		(0.0005)		(0.0001)		(0.0001)		(0.0001)		(0.0002)		(0.0012)	
Female (vs. Male)	-0.0157	**	-0.0018		-0.0046	**	-0.0086	***	-0.0084	***	-0.0272	***	-0.0081	***	-0.0060	**	0.0054		0.0087	***	0.0664	***
	(0.0069)		(0.0011)		(0.0020)		(0.0032)		(0.0030)		(0.0083)		(0.0028)		(0.0027)		(0.0051)		(0.0031)		(0.0189)	
Married (vs. Unmarried)	-0.0073		-0.0008		-0.0021		-0.0039		-0.0039		-0.0124		-0.0037		-0.0027		0.0024		0.0040		0.0304	
	(0.0067)		(0.0008)		(0.0018)		(0.0034)		(0.0033)		(0.0104)		(0.0031)		(0.0024)		(0.0033)		(0.0035)		(0.0247)	
White (vs. Non-White)	0.0054		0.0006		0.0016		0.0030		0.0029		0.0096		0.0029		0.0023		-0.0014		-0.0029		-0.0239	
	(0.0060)		(0.0007)		(0.0017)		(0.0032)		(0.0032)		(0.0104)		(0.0033)		(0.0027)		(0.0021)		(0.0031)		(0.0263)	
Hispanic (vs. Non-Hispanic)	0.0037		0.0004		0.0011		0.0020		0.0019		0.0062		0.0018		0.0013		-0.0014		-0.0020		-0.0151	
	(0.0140)		(0.0015)		(0.0039)		(0.0072)		(0.0069)		(0.0218)		(0.0063)		(0.0044)		(0.0055)		(0.0073)		(0.0530)	
Education (vs. Less than High School)																						
High School	0.0139		0.0016		0.0039		0.0073		0.0070	*	0.0219	*	0.0063	*	0.0044		-0.0055		-0.0073	*	-0.0534	*
	(0.0097)		(0.0013)		(0.0026)		(0.0044)		(0.0042)		(0.0123)		(0.0036)		(0.0028)		(0.0052)		(0.0043)		(0.0297)	
Some College	0.0165		0.0018		0.0046		0.0085	*	0.0082	*	0.0253	*	0.0071	*	0.0048		-0.0069		-0.0086	*	-0.0614	*
	(0.0111)		(0.0014)		(0.0030)		(0.0048)		(0.0046)		(0.0136)		(0.0040)		(0.0031)		(0.0060)		(0.0049)		(0.0327)	
College	0.0076		0.0009		0.0021		0.0040		0.0039		0.0122		0.0035		0.0025		-0.0029		-0.0040		-0.0296	
	(0.0095)		(0.0011)		(0.0026)		(0.0048)		(0.0046)		(0.0142)		(0.0041)		(0.0029)		(0.0044)		(0.0049)		(0.0343)	
Advanced Education	0.0104		0.0012		0.0029		0.0054		0.0052		0.0161		0.0045		0.0031		-0.0044		-0.0055		-0.0389	
	(0.0114)		(0.0013)		(0.0030)		(0.0055)		(0.0050)		(0.0150)		(0.0041)		(0.0028)		(0.0058)		(0.0055)		(0.0361)	

Table 1.5: Effects of Caregiving on Retirees' Life Satisfaction (continued)

Variables	LS = 0 Marginal Effect	Sig.	LS = 1 Marginal Effect	Sig.	LS = 2 Marginal Effect	Sig.	LS = 3 Marginal Effect	Sig.	LS = 4 Marginal Effect	Sig.	LS = 5 Marginal Effect	Sig.	LS = 6 Marginal Effect	Sig.	LS = 7 Marginal Effect	Sig.	LS = 8 Marginal Effect	Sig.	LS = 9 Marginal Effect	Sig.	LS = 10 Marginal Effect	sig.
Income Level (vs. Less than $10,000)																						
Income $10,000-$20,000	-0.0074		-0.0009		-0.0022		-0.0041		-0.0041		-0.0136		-0.0043		-0.0034		0.0016		0.0040		0.0342	
	(0.0083)		(0.0011)		(0.0025)		(0.0047)		(0.0047)		(0.0159)		(0.0053)		(0.0046)		(0.0024)		(0.0043)		(0.0413)	
Income $20,000-$30,000	-0.0150	*	-0.0018		-0.0046	*	-0.0087	*	-0.0087	*	-0.0298	*	-0.0098		-0.0082		0.0014		0.0082	**	0.0770	*
	(0.0083)		(0.0013)		(0.0026)		(0.0047)		(0.0047)		(0.0165)		(0.0061)		(0.0060)		(0.0057)		(0.0039)		(0.0446)	
Income $30,000-$40,000	-0.0076		-0.0009		-0.0023		-0.0043		-0.0042		-0.0141		-0.0044		-0.0035		0.0017		0.0042		0.0354	
	(0.0090)		(0.0011)		(0.0027)		(0.0051)		(0.0052)		(0.0174)		(0.0058)		(0.0050)		(0.0026)		(0.0048)		(0.0447)	
Income $40,000-$50,000	-0.0065		-0.0008		-0.0019		-0.0036		-0.0036		-0.0119		-0.0037		-0.0029		0.0015		0.0036		0.0298	
	(0.0095)		(0.0012)		(0.0029)		(0.0056)		(0.0056)		(0.0189)		(0.0062)		(0.0053)		(0.0023)		(0.0053)		(0.0484)	
Income $50,000-$60,000	-0.0077		-0.0009		-0.0023		-0.0044		-0.0043		-0.0143		-0.0045		-0.0036		0.0017		0.0042		0.0361	
	(0.0099)		(0.0012)		(0.0030)		(0.0058)		(0.0057)		(0.0195)		(0.0065)		(0.0055)		(0.0026)		(0.0054)		(0.0500)	
Income $60,000-$75,000	-0.0176	*	-0.0021		-0.0055	*	-0.0105	**	-0.0106	**	-0.0369	*	-0.0124	*	-0.0107		0.0002		0.0097	**	0.0965	*
	(0.0090)		(0.0015)		(0.0029)		(0.0052)		(0.0053)		(0.0189)		(0.0073)		(0.0074)		(0.0075)		(0.0044)		(0.0518)	
Income $75,000-$100,000	0.0032		0.0004		0.0009		0.0017		0.0017		0.0053		0.0015		0.0011		-0.0011		-0.0017		-0.0129	
	(0.0119)		(0.0013)		(0.0034)		(0.0063)		(0.0060)		(0.0190)		(0.0055)		(0.0038)		(0.0048)		(0.0064)		(0.0461)	
Income $100,000-$150,000	-0.0129		-0.0015		-0.0039		-0.0075		-0.0075		-0.0254		-0.0082		-0.0068		0.0018		0.0071		0.0649	
	(0.0109)		(0.0015)		(0.0032)		(0.0064)		(0.0065)		(0.0226)		(0.0080)		(0.0074)		(0.0047)		(0.0056)		(0.0602)	
Income Greater Than $150,000	0.0014		0.0002		0.0004		0.0008		0.0007		0.0024		0.0007		0.0005		-0.0005		-0.0008		-0.0059	
	(0.0145)		(0.0016)		(0.0042)		(0.0078)		(0.0076)		(0.0241)		(0.0071)		(0.0051)		(0.0053)		(0.0078)		(0.0589)	
Number of adults in the Household	-0.0101	*	-0.0012		-0.0029	*	-0.0055	**	-0.0053	**	-0.0172	**	-0.0052	**	-0.0038	*	0.0033		0.0055	**	0.0424	**
	(0.0059)		(0.0009)		(0.0017)		(0.0028)		(0.0026)		(0.0075)		(0.0024)		(0.0021)		(0.0032)		(0.0024)		(0.0194)	
Number of children in the Household	0.0109		0.0012		0.0032		0.0059		0.0058		0.0187		0.0056		0.0041		-0.0036		-0.0059		-0.0459	
	(0.0101)		(0.0013)		(0.0030)		(0.0052)		(0.0051)		(0.0158)		(0.0047)		(0.0036)		(0.0047)		(0.0051)		(0.0387)	
Region (vs. West)																						
Notrh East	0.0075		0.0008		0.0021		0.0040		0.0038		0.0121		0.0035		0.0025		-0.0029		-0.0040		-0.0295	
	(0.0081)		(0.0009)		(0.0021)		(0.0038)		(0.0037)		(0.0111)		(0.0031)		(0.0022)		(0.0039)		(0.0039)		(0.0267)	
Mid West	0.0163	*	0.0018		0.0046	*	0.0084	**	0.0081	**	0.0251	**	0.0070	**	0.0047	*	-0.0070		-0.0086	**	-0.0604	**
	(0.0093)		(0.0013)		(0.0025)		(0.0040)		(0.0038)		(0.0110)		(0.0032)		(0.0027)		(0.0057)		(0.0040)		(0.0253)	
South	0.0108		0.0012		0.0031		0.0057	*	0.0056	*	0.0177	*	0.0052	*	0.0037		-0.0039		-0.0058	*	-0.0433	*
	(0.0074)		(0.0009)		(0.0020)		(0.0033)		(0.0033)		(0.0098)		(0.0030)		(0.0025)		(0.0037)		(0.0033)		(0.0243)	
Weekend diary day (vs. Weekday)	0.0007		0.0001		0.0002		0.0004		0.0004		0.0013		0.0004		0.0003		-0.0002		-0.0004		-0.0031	
	(0.0040)		(0.0005)		(0.0012)		(0.0022)		(0.0021)		(0.0068)		(0.0020)		(0.0015)		(0.0014)		(0.0022)		(0.0166)	

LS stands for life satisfaction scores, which range from 0 (the worst life satisfaction) to 10 (the best life satisfaction). 2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Standard errors are in parentheses. Survey weights are used. Number of observations = 1,932. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Instrumental variables are from 2012 Market Survey of Long-Term Care Costs. 2012 Across The States: Profiles of Long-Term Services and Supports.

Table 1.6: Effects of Caregiving on Life Satisfaction (Excluding Number of Adults and Children in the Household)

Variables	Low Life Satisfaction		Moderate Life Satisfaction		High Life Satisfaction	
	Marginal Effect	Sig.	Marginal Effect	`Sig.	Marginal Effect	Sig.
Caregiving						
Care of HH Adults	0.4136	**	-0.0747		-0.3389	***
	(0.1908)		(0.1524)		(0.0691)	
Care of Non-HH Adults	-0.1470		-0.1321		0.2791	
	(0.2720)		(0.4199)		(0.6911)	
Care of HH & Non-HH Children	-0.1457		-0.1052		0.2509	
	(0.2912)		(0.4167)		(0.7067)	
Age	0.0003		0.0001		-0.0004	
	(0.0012)		(0.0005)		(0.0017)	
Female (vs. Male)	-0.0612	**	-0.0241	**	0.0852	***
	(0.0303)		(0.0108)		(0.0320)	
Married (vs. Unmarried)	-0.0540	**	-0.0210	**	0.0750	***
	(0.0260)		(0.0100)		(0.0272)	
White (vs. Non-White)	0.0328		0.0147		-0.0474	
	(0.0271)		(0.0110)		(0.0363)	
Hispanic (vs. Non-Hispanic)	-0.0223		-0.0097		0.0320	
	(0.0658)		(0.0286)		(0.0941)	
Education (vs. Less than High School)						
High School	0.0359		0.0126		-0.0485	
	(0.0304)		(0.0107)		(0.0381)	
Some College	0.0434		0.0145		-0.0579	
	(0.0382)		(0.0108)		(0.0453)	
College	0.0214		0.0076		-0.0290	
	(0.0365)		(0.0144)		(0.0503)	
Advanced Education	0.0334		0.0108		-0.0443	
	(0.0390)		(0.0136)		(0.0509)	
Income Level (vs. Less than $10,000)						
Income $10,000-$20,000	-0.0230		-0.0101		0.0331	
	(0.0339)		(0.0177)		(0.0510)	
Income $20,000-$30,000	-0.0696	*	-0.0379		0.1075	*
	(0.0359)		(0.0243)		(0.0552)	
Income $30,000-$40,000	-0.0310		-0.0141		0.0451	
	(0.0516)		(0.0236)		(0.0745)	
Income $40,000-$50,000	-0.0421		-0.0204		0.0624	
	(0.0383)		(0.0245)		(0.0610)	
Income $50,000-$60,000	-0.0386		-0.0183		0.0569	
	(0.0398)		(0.0245)		(0.0628)	

Table 1.6: Effects of Caregiving in Life Satisfaction (Excluding Number of Adults and Children in the Household) (Continued)

Variables	Low Life Satisfaction		Moderate Life Satisfaction		High Life Satisfaction	
	Marginal Effect	Sig.	Marginal Effect	`Sig.	Marginal Effect	Sig.
Income $60,000-$75,000	-0.0698		-0.0388		0.1086	
	(0.0510)		(0.0309)		(0.0786)	
Income $75,000-$100,000	-0.0031		-0.0012		0.0043	
	(0.0450)		(0.0182)		(0.0632)	
Income $100,000-$150,000	-0.0807	*	-0.0469		0.1277	
	(0.0416)		(0.0450)		(0.0824)	
Income Greater Than $150,000	-0.0187		-0.0081		0.0268	
	(0.0493)		(0.0240)		(0.0730)	
Region (vs. West)						
Notrh East	0.0155		0.0056		-0.0211	
	(0.0294)		(0.0092)		(0.0381)	
Mid West	0.0439		0.0146		-0.0584	
	(0.0274)		(0.0137)		(0.0380)	
South	0.0274		0.0101		-0.0375	
	(0.0221)		(0.0096)		(0.0298)	
Weekend diary day (vs. Weekday)	0.0024		0.0009		-0.0033	
	(0.0174)		(0.0065)		(0.0239)	

2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Standard errors are in parentheses. Survey weights are used. Number of observations = 1,932. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Instrumental variables are from 2012 Market Survey of Long-Term Care Costs. 2012 Across The States: Profiles of Long-Term Services and Supports.

Table 1.7: Distribution of Life Satisfaction Score

Life Satisfaction Score	Percentage	Cumulative Percentage
0	0.9788	0.9788
1	0.2250	1.2038
2	0.6753	1.8791
3	1.6840	3.5631
4	2.2240	5.7871
5	13.1400	18.9271
6	7.7600	26.6871
7	11.0400	37.7271
8	27.0000	64.7271
9	9.7470	74.4741
10	25.5200	100.0000

2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Standard errors are in parentheses. Survey weights are used. Number of observations = 1,932.

Chapter II

Experienced Well-being and the Caregiving Responsibilities of Retirees

Abstract

Using data from the 2010 and 2012 American Time Use Surveys (ATUS) and the associated Well-being Modules, this paper examines how caregiving affects the experienced well-being of retirees who are caregivers. The unpleasant index is used as a proxy of experienced well-being. Both caring for adults and caring for children are examined. The results show that, controlling for selection into caregiving, both caring for adults and caring for children negatively affect the experienced well-being of retirees. This suggests that policies that remove some of the caregiving burden from retirees would increase their well-being.

Key Words: informal caregiving, subjective well-being, unpleasantness index (U-index), retirement, time use

1. Introduction

As millions of baby boomers enter late-life stages, many of them will develop some form of physical or cognitive limitations due to declining health and may need to rely on care from their spouses, adult children, or other family members. Because of this, older individuals are taking on more caregiving responsibilities. It is estimated that around 43.5 million adults in the U.S. provided unpaid or informal care to an adult or a child in 2014, and more than half of caregivers are individuals aged 50 and older (Greenwald & Associates, 2015). Therefore, older informal caregivers play an important role in caring for both younger and frail older family members. Furthermore, the estimated economic value of such care provided by informal caregivers is approximately $642 billion a year (Chari et al., 2015). Given the significance of older caregivers in terms of their economic value and participation, it is important to examine whether and how informal caregiving affects the well-being of these older caregivers.

Most of the previous studies on the effect of informal caregiving on the emotional well-being of caregivers examine either general groups of caregivers, such as adult caregivers, or very specific groups of caregivers, such as caregivers of dementia patients. Findings suggest that most caregiving responsibilities are related negatively to well-being of caregivers. An additional limitation is that most studies ignore the issue of endogeneity caused by self-selecting into caregiving roles. A few recent studies address the issue using instrumental variable models (see, for example Kalenkoski & Oumtrakool, 2017). Like these studies, this study focuses on retirees who are caregivers and examines the impact of informal caregiving on the emotional well-being of caregivers using an instrumental variable approach. In addition, this study extends

Kalenkoski and Oumtrakool's (2017) study to examine a different well-being measure, the unpleasant index (U-index), as a proxy for experienced well-being. Results show that, when controlling for selection into caregiving, caring for adults and caring for children are related to a higher U-index, meaning that all the types of caregiving negatively affect the retiree's emotional well-being. These results help financial planners better prepare clients for possible caregiving responsibilities in retirement.

2. Literature Review

2.1 Household Production Model

Time is a commodity, and every individual is limited to the same amount of time per day. Therefore, individuals allocate their time in the most efficient way to maximize their utility subject to budget and time constraints. Time use is classified into three categories: market work, household work, and leisure. In retirement, individuals are no longer engaged in the labor market. Thus, they have more available time than non-retirees to participate in leisure and household work, such as child care for a grandchild or the care for a sick spouse.

A household production function (Becker, 1965) illustrates the relationship between inputs (time spent and purchased goods and services) and outputs (household-produced commodities). Cooked meals, clean clothes, maintained gardens, child well-being, and adult well-being are all examples of household-produced commodities. A production function for a care recipient's well-being can be expressed as:

$$Care\ recipient's\ well-being = W(X, t)$$

where *X* refers to goods and services used in the production of the care recipient's well-being and *t* refers to time spent in caregiving.

Caregivers not only derive utility (i.e., happiness or satisfaction) from an improvement in the health or well-being of a care recipient, but also from the process of caring itself. The utility function of a caregiver can be expressed as:

$$U\ (W, t)$$

where *W* is care recipient's well-being and *t* is time spent in caregiving. Note that time spent in caregiving (*t*) enters the utility function directly as well as through *W*. The utility or disutility derived while engaging in caregiving activities (*t*) is called "process utility" (Brouwer, 2005; Kalenkoski, 2017; Kalenkoski and Oumtrakool, 2017). Therefore, total utility derived from a commodity includes both process utility and outcome utility. The household production model suggests that a person will undertake caregiving responsibilities only if it provides net positive utility.

2.2 Experienced Well-Being

Subjective well-being is a general expression about how individuals experience and assess their entire lives or specific domains and activities in their lives (Stone and Mackie, 2014). Subjective well-being can be categorized into two main dimensions: evaluative well-being (i.e., overall life satisfaction) and experienced ("hedonic" or "emotional") well-being. Evaluative well-being cognitively reflects how satisfied individuals are with their life as a whole (National Research Council, 2012) while experienced well-being—the focus of this current study— captures individuals' emotional states associated with recent activities, such as momentary positive (e.g., happy, and meaningful) and negative (e.g., sad, painful, tired, and stressful) affective states (for example Kushlev et al., 2015; Hudson et al., 2016; Kalenkoski and Oumtrakool, 2017; Kalenkoski, 2017). Evaluative well-being is usually assessed with the

Cantril's Ladder scale (Cantril, 1965), which measures the general quality of life of respondents. Experienced well-being can be used as a measure of "process utility" that a person gains directly while engaging in an activity (for example Brouwer, 2005; Connelly and Kimmel, 2015; Kalenkoski, 2017; Kalenkoski and Oumtrakool, 2017).

The standard method of collecting experienced well-being is the Experience Sampling Method (ESM), which requires people to rate their feelings multiple times per day and includes questions about what they are doing and how they are feeling while doing the activities. This method is time-consuming and expensive to administer. However, it is less likely to be subject to recall bias. The alternative method is the Day Reconstruction Method (DRM), which requires people to complete a diary of yesterday's activities and rate their feelings during the activities (Kahneman et al., 2004). This method is cheaper to administer and still provides an assessment of experienced well-being that is consistent with the ESM (Kahneman and Krueger, 2006). There are several national surveys that use the DRM method, including American Time Use Survey (ATUS).

While the positive and negative affect measures and the meaningfulness measure are important aspects of well-being to examine, these measures are subject to interpersonal differences in the use of scales. This means a particular rating on a measure does necessarily not have the same meaning for each respondent, so respondents may interpret and rate the response categories differently. This can cause an inaccurate assessment of emotional well-being. As an example, person A and person B might rate a happiness measure as 3 (with a possible rating ranged from 0 to 6) while engaging in an activity. However, the rating of 3 from person A maybe equivalent to the rating of 4 from

person B. Therefore, it is possible that person A is actually happier than person B even though they give the same rating score. Despite the inherent subjectivity, most of the studies examining the process utility of caregiving utilize the positive and negative affect questions as a measure of experienced well-being (for example Brouwer, 2005; Tyler, 2006; Connelly and Kimmel, 2015; Kalenkoski, 2017; Kalenkoski and Oumtrakool, 2017).

There is an alternative well-being measure that is constructed from the affect questions called the "unpleasant index" or the "U-index" proposed by Kahneman and Krueger (2006). It measures the portion of time that is spent in an unpleasant state. The first step in constructing the U-index is to calculate the unpleasantness dummy variable for a given activity. It is defined as equal to 1 if the highest rating on any of the negative affects (e.g., tired, pain, sad, and stress scores) strictly exceeds the highest rating of the positive affects (e.g., meaningfulness and happiness scores), and 0 if not (full detail is discussed in method section). Because the U-index is based on an ordinal measure of affect scores, it lessens the impact of interpersonal differences in the use of scales. In addition, from a psychological perspective, most people are in a positive affect state for most of the time. Therefore, when the negative affect is rated as the most intense affect in an episode, it is a significant incidence because being in a negative affect state is less common (Kahneman et al., 2004). This helps to identify activities that cause disutility. However, it is important to note that a major disadvantage of this measure is that it doesn't present the intensity of emotions (Kahneman & Krueger, 2006). In addition, the U-index assumes that all individuals share a common assessment of activity-level

unpleasantness for each activity, and individuals are only different in how they allocate

their time on their diary day (Krueger, 2007).

2.3 Caregiving and Experienced Well-Being of Caregivers

The existing literature on caregiving provides mixed evidence on the effects of

caregiving on the emotional well-being of caregivers. Studies do note that the effect

varies depending on types of care. However, most studies ignore the issues of

endogeneity caused by self-selecting into caregiving roles. A number of studies show the

positive outcomes of caregiving, in which the care is viewed as a meaningful and

rewarding experience to caregivers. Donaldson and Shackley (1997) suggest comparing

two treatments with identical results, but with different processes to measure whether

process utility exists. A survey, based on 950 Dutch caregivers, compares happiness

from a situation in which the caregiver provides care to a care recipient him/herself to the

hypothetical situation where someone else assumes the caregiving role. The study finds

that almost half of informal caregivers derive positive process utility from the process of

providing care, and that the caregivers' happiness would decline if someone else were to

take over those tasks (Brouwer et al., 2005).

Regarding the intensity of care, caregiving is physically and emotionally

exhausting work. Informal caregivers are happier than non-caregivers are if caring

responsibilities are less than 6 hours per week. However, caregiving is associated with

lower levels of happiness if caregivers provide care for more than 11 hour per week

(Campen et al., 2012).

Regarding caring for children, the effect of child care on experienced well-being

of a caregiver is not conclusive. There are evidence that parents with children have worse

emotional well-being than those without children (for example McLanahan and Adam, 1987; Hansen, 2012). Connelly and Kimmel (2015) find that mothers report higher level of stress and tiredness when engaging in child caregiving than fathers, but they do not report different happiness and meaningfulness level. When analyzing the unpleasant index, mothers, compared to fathers, report a higher portion of time spent on child caregiving as unpleasant. However, Nelson et al., (2012) note a contrary finding that parents, especially fathers, report higher levels of happiness and other positive emotions than nonparents do. Deaton and Stone (2014) analyze Gallup survey and show that parents with children are associated with more of both positive (e.g., happiness, enjoyment, and smiling) and negative (e.g., sadness, anger, worry, stress, and pain) affect measures than those without children. Considering older caregivers, a study using the ATUS data to examine the effect of caregiving on emotional well-being of retirees finds that retirees who provide child care report higher level of tiredness, pain, and sadness, but less stress and happiness than those who do not provide child care (Kalenkoski & Oumtrakool, 2017).

Regarding caring for adults, the literature provides mixed evidence. Studies show that caregiving is associated with feeling good about being able to provide care to injured family members (Wells et al., 2005), as well as a higher level of sense of purpose in life (Marks et al., 2002). Pinquart and Sorenson (2003) performed a meta-analysis based on findings from 84 articles examining differences in the well-being of caregivers providing care for frail older adults and non-caregivers. They find that caregivers have higher levels of stress (also see Schulz et al., 2012; Kalenkoski & Oumtrakool, 2017) and depression (also see Marks et al., 2002; Malhotra et al., 2012), and have lower levels of

subjective well-being (i.e., positive affect scales) (also see Kalenkoski & Oumtrakool, 2017).

Although life satisfaction and experienced well-being partially overlap and share some common variance (Lucas et al., 1996; Kim-Prieto et al., 2005), life satisfaction differs from experienced well-being and can be assessed as a separate element of well-being (Andrews and Withey, 1976; Stone and Mackie, 2014; Kapteyn et al., 2015; Dolan et al., 2016). For example, an individual providing care to his/ her sick parents may experience negative emotional well-being due to feeling saddened and stressed, but at the same time feel satisfied with life overall. Because of the various dimensions, it is also important to utilize multiple experienced well-being measures to acquire a complete picture of subjective well-being. This study fills a gap in the literature by focusing on the sample of retirees who are caregivers. Additionally, this study extends Kalenkoski and Oumtrakool's (2017) work by examining a different well-being measure, the unpleasant index, as a proxy for experienced well-being.

3. Method

3.1 Data

This study uses data from the 2010 and 2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). The ATUS is a nationally representative and cross-sectional survey. ATUS respondents were chosen from participants in the Current Population Survey (CPS). After completion of the CPS, one respondent aged 15 or older per household was selected for the ATUS. Each respondent to the ATUS answered survey questions and completed a 24-hour time diary covering the period between 4 a.m. on the day before the interview and 4 a.m. on the day of the interview. Respondents

provided information on the activities they performed on that day, at what times, and with whom.

All ATUS respondents were selected for the WBM, which collected information on how each respondent felt during performing three randomly selected activities on the diary day. Only activities that lasted for at least 5 minutes were eligible to be randomly selected. Sleeping, grooming, and personal activities were not eligible activities. Six questions related to the quality of life, including five affect questions about how the respondent felt during engaging in the activity (i.e., happiness, tiredness, stress, sadness, and pain) and one question about how meaningful the activity was, were asked about each randomly selected activity. These questions are on a scale ranging from 0 to 6, where 0 meant not at all happy, tired, stressed, sad, in pain, or meaningful, and 6 meant very happy, tired, stressed, sad, in pain, or meaningful.

This study focuses on retirees. The final sample includes 3,866 retirees who completed the five affect questions in the WBM. Retirees are defined as individuals who, at the time of the survey, were at least 50 years old, were not currently in the labor force, did not report any time spent on work, or work-related activities, nor travel related to work on their diary day. In addition, they reported being retired or that they didn't want a job. Information on the retirees' gender, marital status, race, ethnicity, education, income level, region of residence, and household composition (number of adults and children in the household) were obtained from either the ATUS or CPS survey. Weights provided within the survey were used to adjust the sample to be nationally representative and to account for duration and probability that a specific activity was selected.

Dependent Variables

The dependent variable of this study is a person-level unpleasantness index, which can be interpreted as the percentage of the respondent's total awake time that is spent in an unpleasant state. To construct the person-level U-index, first the unpleasantness dummy variable is created for each of the randomly selected three activities that a respondent engaged in and provided well-being ratings on. Only activities with at least 30 well-being ratings are included to ensure sufficiently large sample size. This results in 36 included activities. The dummy variable takes a value of 1 for an activity if the highest rating on any of the negative affects (i.e., tired, pain, sad, and stress score) is strictly greater than the highest rating of the positive affect (i.e., happy score), and 0 if not. For example, if a respondent provided household-adult care and reported the following affect scores for the activity: happy = 3, tired = 5, stressful = 4, sadness = 2, and painful = 1, then this activity is characterized as unpleasant and the unpleasantness dummy variable has a value of 1. This is because the highest rating on any of the negative affects (tired = 5) is greater than the highest rating on the positive affects (happy = 3). The meaningful measure is excluded when calculating the U-indices because it is not an affect measure. It is an indicator of a reason for engaging in an activity, which is another aspect of utility (Connelly & Kimmel, 2015).

Next, the unpleasantness dummy variable is multiplied by the respondent's duration of time spent in that activity to create the duration-weighted unpleasantness dummy variables, which are then averaged over all respondents who reported affect scores for the activity. This is called "activity-level U-indices." To construct the person-level U-index, activity-level U-indices are then applied to a respondent's actual time use

on his or her diary day in all 36 included activities. The person-level U-index ranges from 0 to 1. Therefore, the person-level U-index is a continuous variable. If the variable equals to 0, it means that the respondent did not have any part of his or her diary day in an unpleasant state. If the variable equals to 0.5, then 50 percent of the respondent's total awake time was in an unpleasant state.

Table 2.1 presents the 36 activities included in the U-index construction and provides the percentage of respondents who rated the activity as unpleasant experience. For example, on average, almost 25 percent of retirees describe time spent in financial management activities as unpleasant. Nearly 26 percent of retirees characterize the caring for household-adult activity as unpleasant. Almost 20 percent of retirees describe the caring for household-children activity as unpleasant, while less than 10 percent of retirees indicate the caring for non-household adult, the caring for non-household children, socializing, and working out as unpleasant.

Explanatory Variables

Indicators for the two types of caregiving are the key explanatory variables that are examined in this study. Caring for adults is a dichotomous variable with a code of 1 if the respondent reports time spent on caring for either household or non-household adults and a code of 0 if no time was spent. Caring for children or grandchildren is also a dichotomous variable with a code of 1 if the respondent reports time spent on caring for either household or non-household children and a code of 0 if no time was spent.[5]

---

[5] The initial model investigating four types of caregiving: caring for household adults (N=147 or 3.8% of sample), caring for non-household adults (N=324 or 8.3% of sample), caring for household children (N=73 or 1.9% of sample), and caring for non-household children (N=204 or 5.2% of sample), did not converge due to lack of variation. Therefore, caring for household adults and caring for non-household adults are

Control variables are included to account for differences in preferences toward caregiving across demographic groups, economic circumstances, and constraints on commodity production. They are included both in the well-being models and in the caregiving probit selection models. Control variables include age, gender, marital status, race, ethnicity, education, income level, number of adults in the household, and number of children in the household.

Income level is associated negatively with daily negative emotions but is weakly associated or uncorrelated to positive emotions (Kahneman & Deaton, 2010; Stone et al. 2016). Kushlev et al. (2015), using ATUS data, find that a higher income level is related to less daily sadness, but is uncorrelated with daily happiness. Hudson et al. (2016) replicate the Kushlev et al. study using data from the German Socioeconomic Panel (GSOEP) and find similar results. Income is therefore included in the analysis. It is a categorical variable (less than $10,000 is the reference).

The effect of gender on experienced well-being is mixed. Hudson et al. (2016) find no significant difference in daily happiness and sadness between males and females. Other studies suggest a difference. Brouwer et al., (2005) find that male caregivers experience lower process utility than female caregivers. However, Stone et al. (2016) find that females are more likely to report lower levels of stress, tiredness, and pain than males. Lin, Fee, and Wu (2012) use structural equation modeling to capture caregivers' negative and positive experiences and find that female caregivers are more likely to report having more negative experiences than male caregivers. Women are also more likely to undertake child-care and adult-care responsibilities than men (Bianchi, 2000), so

grouped into one adult care variable. Caring for household children and caring for non-household children are also grouped into one child care variable.

it is important to control for the effect of gender. If a respondent is female, the female variable is coded as 1 and as 0 otherwise.

Being married is associated with higher daily happiness, but uncorrelated with daily sadness (Hudson et al., 2016; Stone et al., 2016). If a respondent is married, the married variable is coded as 1 and as 0 otherwise. Being white is associated with being happier and experiencing fewer negative emotions than non-whites (Dolan et al., 2016). If a respondent is white, the white variable is coded as 1 and as 0 otherwise. Luttmer (2005) finds that Hispanics are happier than whites. If a respondent is Hispanic, the Hispanic variable is coded as 1 and as 0 otherwise. Higher educational attainment is associated with lower negative experienced emotions. Stone et al. (2016) find that individuals with a high education level have lower levels of sadness and pain. Education information is included as categorical variables (less than high school is the reference).

The effect of age on experienced well-being is not entirely clear. Hudson et al. (2016) find that age is related negatively to daily happiness but is uncorrelated with daily sadness. However, the predominant finding is that there is a U-shaped relationship between age and happiness and an inverted U-shaped trend for negative well-being (Stone et al. 2010; Dolan & Kudrna, 2015; Stone et al. 2016). Brouwer et al., (2005) find that age is a significant predictor of process utility that caregivers derived from the caring process. In this study, age of respondent, number of adults in the household, and number of children in the household are continuous variables.

Studies show that there also may be a day-of-the-week effect on well-being. People reported more positive emotions and fewer negative emotions on weekends than on weekdays (Stone et al., 2012; Helliwell and Wang, 2014). In retirement, retirees have

more available time on both weekdays and weekends. Therefore, the day-of-week effect

diminishes for older and retired individuals (Stone et al., 2012). Weekend diary day is a

dummy variable to account for the possible day-of-the-week effect. If a respondent is

interviewed on weekends, the weekend variable is coded as 1 and as 0 otherwise.

Instrumental Variables

Respondents with a lower U-index may be more likely to select themselves into

caregiving roles than respondents with higher U-index because they are happier.

Similarly, respondents who provide caregiving may derive net positive utility from the

activity and feel happier than non-caregivers. This self-selecting can cause endogeneity

problem, and as a result, the estimates of key explanatory variables (types of caregiving)

will be biased.

Additional state-level and year-state-level data are merged with the combined

ATUS and WBM data as instrumental variables to address the selection bias. These

variables measure the cost and availability of purchased care at year-state or state level.

The measures affect an individual's decisions on whether to engage in caregiving, as

purchased care is a substitute for one's own time. However, they should not affect an

individual's well-being directly.

The year-state-level instrumental variables are the median annual cost of a

private-room nursing home, which comes from the publications "Genworth 2010 and

2012: Cost of Care Survey," and the Adult Day Services Daily Rate (in $1,000), which

comes from the publications "2010 and 2012 Market Survey of Long-Term Care Costs."

The state-level instrumental variables come from the publication "2012 Across the States:

Profiles of Long-Term Services and Supports" (Houser et al. 2012). The state-level

variables include the ratio of the economic value of family caregiving to Medicaid long-term care spending, the number of private long-term care insurance policies in effect per 1000 people aged 40 and above, the value of Medicaid expenditures per person served at nursing facility services, and the number of people receiving the Administration for Community Living (ACL) congregate meals per 1000 people aged 65 and above.

Table 2.2 presents descriptive statistics for all of the variables included in this analysis. On average, retirees report that they are in an unpleasant state about 37% of the time. The lowest response is 25.35% of the time and the highest response is 56.88% of the time. On the diary day, 13.08% of retirees provided care for adults, and 7.55% of retirees engaged in child care. Regarding the demographic characteristics of the sample, their average age is 72, 60.21% are female, 60.53% are married, 87.27% are white, 5.39% are Hispanic, 16.38% have less than a high school education, 38.23% have attained high school, 22.01% have attained some college education, 14.55% have attained a college degree, and 8.85% have advanced education. 5.82% of the retirees have an income of less than $10,000. 17.18% have an income between $10,000 and $20,000. 19.37% have an income between $20,000 and $30,000. 13.19% have an income between $30,000 and $40,000. 8.18% have an income between $40,000 and $50,000. 8.23% have an income between $50,000 and $60,000. 8.87% have an income between $60,000 and $75,000. 7.66% have an income between $75,000 and $100,000. 5.38% have an income between $100,000 and $150,000. 3.13% have an income of greater than $150,000. The average number of adults per retiree household is 1.87, and the average number of children per retiree household is 0.07. 19.08% live in the Northeast, 25.21% live in the Midwest, 37.33% live in the South, and 18.38% live in the West regions.

28.84% completed the survey during the weekend, and 71.16% completed the survey on a weekday.

Table 2.3 shows differences in the person-level U-index by whether a retiree participates in the different categories of care. If caring activities are categorized into 4 groups based on whether care recipients reside with the retiree caregivers and whether care recipients are adults or children, retirees who care for adults inside their household report that they spend a significantly higher percentage of the time in unpleasant state than those who do not provide the care. However, retirees who care for adults outside their household do not report a difference percentage of the time in unpleasant state than those who do not. Retirees who care for children either inside or outside their household do not report a difference percent of the time in unpleasant state than those who do not care for children.

If caring activities are categorized into 2 categories based on whether care recipients are adults or children, retirees who care for either adults or children do not report a difference percentage of the time in unpleasant state than those who do not provide the care. However, these descriptive results do not control for differences in demographics and self-selection into caregiving activities. They are unconditional associations. Therefore, the model presented in the next section of this paper accounts for self-selection into caregiving activities.

3.2 Model

Given that the dependent variable is a person-level unpleasantness index, which is a continuous variable, a continuous model is utilized to investigate the effects of caregiving (equation 1). A probit regression is utilized for each type of caregiving selection model (equations 2). The joint model estimated via Limited Information Maximum Likelihood (LIML) using the "cmp" command in STATA is given by:

$$U_i^* = \alpha_0 + \alpha_1 C_A + \alpha_1 C_C + \alpha_2 X_i + a_i \qquad (1)$$

$$C_j^* = \beta_0 + \beta_1 X_i + \beta W_i + b_j \qquad (2)$$
$$C_j = 1 \text{ if } C_j^* > 0$$
$$= 0 \text{ if } C_j^* \leq 0$$
$$\text{for each } _j, _j = A \text{ and } C$$

Equation 1 is a continuous model, in which U_i^* is the latent variable behind the observed U_i. U_i is an individual's person-level unpleasantness index (ranging from 0 to 1). C_A and C_C are indicators for whether the person cares for an adult or a child, respectively, on the diary day. X_i is a vector of person-level characteristics. a_i is the error term and the alphas are the parameters to be estimated.

For equation 2, C_j^* is the latent net benefit the person derives from engaging in caregiving activity j, where j is caring for an adult (A) or caring for a child (C). C_j is an indicator variable and equals to one if caregiving activity j is performed and equals to zero if not. W is the vector of instrumental variables. b_j is the error term. The betas are the parameters to be estimated. Estimating these equations jointly improves the

efficiency of the estimates over any two-stage instrumental variables approach.

Kalenkoski and Oumtrakool (2017) estimate a similar model to account for selection into

caregiving.

4. Results

Table 2.4 presents the estimated effects of each of the different types of

caregiving activities on the person-level U-index controlling for the endogeneity of

caregiving. Caring for adults increases the U-index or the percentage of the time that is

described as unpleasant of retirees by 0.05. Caring for children also increases the U-

index of retirees by 0.06. Thus, both types of care negatively affect the experienced well-

being of retirees who are caregivers. In addition, these are relatively large effects given

that the mean of the person-level U-index is 0.37.

The relationships among several of the control variables and the U-index are also

statistically significant, but with relatively small effect. Age is associated with a higher

U-index. Being female is associated with a higher U-index compared to being male.

Being Hispanic is associated with a lower U-index compared to being non-Hispanic. An

additional child living in a retiree's household decreases the U-index. Marital status,

race, education level attained, income level, and number of adult living in the household

are not statistically significant.

Table 2.5 in the appendix B shows the marginal effect for the caregiving selection

probit models. The significance of the 6 instrumental variables can be viewed in this

table. In each of these probits, there are multiple instruments that are highly individually

significant, and each instrument needs to be individually significant in at least one

selection model in order to be included as an instrument. The model needs at least two

instrumental variables for identification. In addition, the entire set of instruments is highly jointly significant in child care case[6].

5. Conclusion and Discussion

This paper uses data from the 2010 and 2012 ATUS and WBM to examine how caring for adults and children affects the experienced well-being of retirees who are caregivers. This study uses the unpleasant index as a measure of experienced well-being. The results show that caring for adults and caring for children are related to a higher U-index, indicating that, on average, retirees who care for adults or children spend a higher percentage of their time in unpleasant state than those who do not provide the care. Thus, both caring for adults and caring for children reduces the experienced well-being of retirees who are caregivers.

These results are consistent with the findings in the work of Kalenkoski and Oumtrakool (2017), which also examines the effect of caregiving on experienced well-being, but uses conventional affect questions (e.g., happy, meaningful, sad, etc.) to measure the experienced well-being. They find that most caregiving negatively affects the emotional well-being of retirees. Using the 2008 and 2009 Gallup-Healthways Well-being Index, Kahneman and Deaton (2010) also find that caregiving is negatively related to daily emotions and that log income is positively related with emotional wellbeing, though the effect tapers off after reaching an annual income of $75,000. However, this study finds that income is not associated with the well-being.

---

[6] To determine whether the instruments are valid, two additional tests are performed. The instruments are statistically significant in the caregiving selection equations and pass the overidentification test. Results are available upon request.

Government policies or programs that could take away some of the responsibility of caring for adults and children from retirees would likely improve their emotional well-being. Studies have shown that using Adult Day Service (ADS) centers (Sussman and Regehr, 2009; Valadez et al., 2005; Molzahn et al., 2009), support groups, or respite services (Sörensen et al., 2002) help improve caregivers' overall well-being and lessen the feeling of being burdened and stressed.

If the goal of individuals is to maximize their expected lifetime utility, financial planners should help their clients plan for possible caregiving responsibilities. Caregiving is not only physically and emotionally exhausting, but also financially straining. One tool that financial planners can use is to recommend that their clients purchase long-term-care insurance for family members who may need on-going assistance in the future. This could prevent substantial long-term care expenses and involuntary caregiving, which constrains a person's utility maximization and decreases his or her utility.

Table 2.1: Percentage of individuals who rate the activity as unpleasant

	Average activity-level percentage unpleasant	Sample Size
Health-related self-care	43.12%	133
Interior cleaning	19.46%	323
Laundry	14.64%	173
Sewing, repairing, & maintaining textiles	13.34%	33
Storing interior household items, include food	14.85%	52
Food and drink preparation	17.04%	820
Kitchen and food clean-up	18.35%	292
Exterior cleaning	23.00%	31
Lawn, garden, and houseplant care	18.21%	205
Care for animals and pets	12.44%	147
Walking / exercising / playing with animals	13.15%	67
Financial management	24.55%	34
Household & personal organization and planning	12.98%	132
Household & personal mail & messages	16.59%	91
Household & personal e-mail and messages	10.60%	66
Grocery shopping	20.60%	124
Shopping, except groceries, food and gas	22.10%	220
Using health and care services outside the home	12.82%	36
Eating and drinking	13.95%	1,811
Socializing and communicating with others	8.79%	437
Relaxing, thinking	20.03%	246
Television and movies (not religious)	22.13%	1,152
Listening to the radio	16.22%	30
Playing games	13.53%	114
Computer use for leisure (excluding games)	13.43%	115
Reading for personal interest	11.31%	459
Walking	17.28%	95
Working out, unspecified	9.59%	30
Telephone calls to/from friends, neighbors, or acquaintances	13.42%	56
Attending religious services	15.04%	125
Participation in religious practices	17.72%	82
Telephone calls to/from family members	14.08%	117
Caring for household adults	25.83%	29
Caring for non-household adults	7.32%	61
Caring for household children	19.54%	28
Caring for non-household children	0.93%	58

2010 and 2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Samples are restricted to retirees who participated in that activity and responded well-being questions. Survey weights were used.

Table 2.2: Descriptive statistic

Dependent variables	Mean	Std. Error	Min	Max
U-Index	0.3681	0.0009	0.2535	0.5688

Independent variables	Mean	Std. Error
Caregiving		
Adult care	0.1308	0.0073
Child care	0.0755	0.0054
Age	72.2872	0.1620
Female	0.6021	0.0101
Married	0.6053	0.0094
White	0.8727	0.0061
Hispanic	0.0539	0.0042
Education		
Less than high school	0.1638	0.0074
High school	0.3823	0.0101
Some college	0.2201	0.0083
College	0.1455	0.0071
Advance education	0.0885	0.0055
Income Level		
Income Less than $10,000	0.0582	0.0042
Income $10,000-$20,000	0.1718	0.0073
Income $20,000-$30,000	0.1937	0.0081
Income $30,000-$40,000	0.1319	0.0070
Income $40,000-$50,000	0.0818	0.0056
Income $50,000-$60,000	0.0823	0.0059

Table 2.2: Descriptive statistic (continued)

Dependent variables	Mean	Std. Error
Income $60,000-$75,000	0.0887	0.0062
Income $75,000-$100,000	0.0766	0.0057
Income $100,000-$150,000	0.0538	0.0050
Income Greater Than $150,000	0.0313	0.0038
Number of adults in the household	1.8661	0.0157
Number of children in the household	0.0704	0.0064
Region		
Northeast	0.1908	0.0082
Midwest	0.2521	0.0088
South	0.3733	0.0099
West	0.1838	0.0079
Diary day		
Weekend	0.2884	0.0078
Weekday	0.7116	0.0078
Instrumental variables	**Mean**	**Std. Error**
By year and State:		
Median annual cost of a private-room nursing home[1]	83.0100	0.3939
Adult Day Services Daily Rate (in $1,000)[2]	0.0668	0.0003
By State:		
Ratio of the economic value of family caregiving to Medicaid long-term care spending[3]	4.5046	0.0361
Number of private long-term care insurance policies in effect per 1000 people aged 40 and above[2]	45.3354	0.4347
Value of Medicaid expenditures per person served at nursing facility services	29.2343	0.1184
Number of people receiving the Administration for Community Living (ACL) congregate meals per 1000 people aged 65 and above	43.3625	0.5836

2010 and 2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Number of observations is 3,866. Survey weights were used. Sources: [1] Genworth 2010 and 2012: Cost of Care Survey. [2] 2010 and 2012 Market Survey of Long-Term Care Costs. [3] 2012 Across the States: Profiles of Long-Term Services and Supports

Table 2.3: Retirees' Average Person-level U-Index by Caregiving Activities

Variables	U-Index	Sig.
Care for HH-adults	0.3785	**
Do not care for HH-adults	0.3675	
Care for non-HH-adults	0.3673	
Do not care for non-HH-adults	0.3682	
Care for HH-children	0.3744	
Do not care for HH-children	0.3680	
Care for non-HH children	0.3671	
Do not care for non-HH children	0.3682	
Care for Adults	0.3687	
Do not care for Adults	0.3681	
Care for Children	0.3668	
Do not care for Children	0.3682	

2010 and 2012 American Time Use Survey (ATUS) and its Well-being Module (WBM).
Number of observations is 3,866. Survey weights were used.
* U-Index is statistically different across groups at the 90% confidence level.
** U-Index is statistically different across groups at the 95% confidence level.
*** U-Index is statistically different across groups at the 99% confidence level.

Table 2.4: Effects of Caregiving on Retirees' Unpleasant Index

Variables	Unpleasant Index	
	Coef.	Sig.
Caregiving		
Care of Adults	0.0515	***
	(0.0083)	
Care of Children	0.0646	***
	(0.0059)	
Age	0.0006	***
	(0.0001)	
Female (vs. Male)	0.0120	***
	(0.0020)	
Married (vs. Unmarried)	-0.0020	
	(0.0026)	
White (vs. Non-White)	-0.0028	
	(0.0029)	
Hispanic (vs. Non-Hispanic)	-0.0097	**
	(0.0041)	
Education (vs. Less than High School)		
High School	0.0003	
	(0.0028)	
Some College	0.0019	
	(0.0032)	
College	0.0058	
	(0.0038)	
Advanced Education	0.0051	
	(0.0044)	
Income Level (vs. Less than $10,000)		
Income $10,000-$20,000	0.0056	
	(0.0039)	
Income $20,000-$30,000	0.0000	
	(0.0040)	
Income $30,000-$40,000	0.0035	
	(0.0045)	
Income $40,000-$50,000	0.0014	
	(0.0050)	
Income $50,000-$60,000	-0.0026	
	(0.0047)	
Income $60,000-$75,000	0.0034	
	(0.0051)	
Income $75,000-$100,000	-0.0008	
	(0.0057)	
Income $100,000-$150,000	-0.0009	
	(0.0058)	
Income Greater Than $150,000	-0.0031	

Table 2.4: Effects of Caregiving on Retirees' Unpleasant Index

Variables	Unpleasant Index	
	Coef.	Sig.
	(0.0062)	
Number of Adult in the Household	-0.0009	
	(0.0019)	
Number of Children in the Household	-0.0081	***
	(0.0031)	

2010 and 2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Standard errors are in parentheses. Survey weights are used. Number of observations = 3,866.

* indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Instrumental variables are from Genworth 2010 and 2012: Cost of Care Survey, 2010 and 2012 Market Survey of Long-Term Care Costs, and 2012 Across the States: Profiles of Long-Term Services and Supports.

References

Becker, Gary S. (1965). "A Theory of the Allocation of Time," *The Economic Journal*, 75(299), 493-517.

Bianchi, Suzanne M. (2000). "Maternal employment and time with children: Dramatic change or surprising continuity?," *Demography*, Vol. 37, No. 4, pp. 401-414.

Brouwer, Werner BF; van Exel , N. Job A.; Van den Berg , Bernard; Van den Bos, Geertruidis AM; and Koopmanschap, Marc A. (2005). "Process utility from providing informal care: the benefit of caring," *Health policy*, Vol. 74, No. 1, pp. 85-99.

Cantril, Hadley (1965). "The pattern of human concerns". Rutgers University Press, New Brunswick, NJ

Campen, Cretien Van; de Boer, Alice H.; and Iedema, Jurjen. (2012). "Are informal caregivers less happy than noncaregivers? Happiness and the intensity of caregiving in combination with paid and voluntary work," *Scandinavian journal of caring sciences*, Vol. 27, No. 1, pp. 44-50.

Connelly, Rachel; and Kimmel, Jean. (2015). "If You're Happy and You Know It: How Do Mothers and Fathers in the US Really Feel about Caring for Their Children?," *Feminist Economics*, Vol. 21, No. 1, pp. 1-34.

Dolan, Paul; and Kudrna, Laura. (2015). "More years, less yawns: fresh evidence on tiredness by age and other factors," *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, Vol. 70, No. 4, pp. 576-580.

Dolan, Paul; Kudrna, Laura; and Stone, Arthur. (2016). "The measure matters: an investigation of evaluative and experience-based measures of wellbeing in time use data," *Social Indicators Research*, Vol. 134, No. 1, pp. 57-73.

Donaldson, Cam; and Shackley, Phil. (1997). "Does "process utility" exist? A case study of willingness to pay for laparoscopic cholecystectomy," *Social science & medicine*, Vol. 44, No. 5, pp. 699-707.

Genworth Financial (2010). "Genworth 2010: Cost of Care Survey" https://www.genworth.com/dam/Americas/US/PDFs/Consumer/corporate/coc_10.pdf. Accessed 8/18/14.

Genworth Financial (2012). "Genworth 2012: Cost of Care Survey" https://www.genworth.com/dam/Americas/US/PDFs/Consumer/corporate/coc_12.pdf. Accessed 8/18/14.

Greenwald & Associates (2015). "Caregiving in the U.S. 2015," *National Alliance for Caregiving and the AARP Public Policy Institute*.

Hansen, Thomas. (2012). "Parenthood and happiness: A review of folk theories versus empirical evidence," *Social Indicators Research*, Vol. 108, No. 1, pp. 29-64.

Houser, Ari; Fox-Grage, Wendy; and Ujvari, Kathleen (2012). "2012 Across The States: Profiles of Long-Term Services and Supports," http://www.aarp.org/home-garden/livable-communities/info-09-2012/across-the-states-2012-profiles-of-long-term-services-supports-AARP-ppi-ltc.html. Accessed 8/19/14.

Hudson, Nathan W.; Lucas, Richard E.; Donnellan, M. Brent; and Kushlev, Kostadin. (2016). "Income Reliably Predicts Daily Sadness, but Not Happiness: A Replication and Extension of Kushlev, Dunn, and Lucas (2015)," *Social Psychological and Personality Science,* Vol. 7, No. 8, pp. 828-836.

Kahneman, Daniel; and Deaton. Angus. (2010). ""High income improves evaluation of life but not emotional well-being," *Proceedings of the national academy of sciences*, Vol. 107, No. 38, pp. 16489-16493.

Kahneman, Daniel; and Krueger, Alan B. (2006). "Developments in the Measurement of Subjective Well-being," *Journal of Economic Perspectives*, Vol. 20, No. 1, pp. 3-24.

Kahneman, Daniel; Krueger, Alan B.; Schkade, David A.; Schwarz, Norbert; and Stone, Arthur A. (2004). "A Survey Method for Characterizing Daily Life Experience: The Day Reconstruction Method," *Science*, Vol. 306, No. 5702, pp. 1776–1780.

Kalenkoski, Charlene M. (2017). "*Caregiving by Older Adults: Gender Differences in Well-being*," in Gender and Time Use in a Global Context: The Economics of Employment and Unpaid Labor, edited by Rachel Connelly and Ebru Kangar, Palgrave Macmillan.

Kalenkoski, Charlene M., & Oumtrakool, Eakamon. (2017). "The caregiving responsibilities of retirees: what are they and how do they affect retirees' well-being?." *Applied Economics*, Vol. *49, No.* 13, pp. 1298-1310.

Kim-Prieto, Chu; Diener, Ed; Tamir; Maya; Scollon, Christie; and Diener, Marissa. (2005). "Integrating the diverse definitions of happiness: A time-sequential framework of subjective well-being," *Journal of happiness Studies*, Vol. 6, No. 3, pp. 261-300.

Krueger, Alan B. (2007). "Are we having more fun yet? Categorizing and evaluating changes in time allocation" *Brookings Papers on Economic Activity,* No. 2, pp. 193-215.

Kushlev, Kostadin; Dunn, Elizabeth W.; and Lucas, Richard E. (2014). "Higher income is associated with less daily sadness but not more daily happiness," *Social Psychological and Personality Science,* Vol. 6, No. 5, pp. 1-7.

Lin, I-Fen; Fee, Holly R.; and Wu, Hsueh-Sheng. (2012). "Negative and positive caregiving experiences: A closer look at the intersection of gender and relationship," *Family Relations*, Vol. 61, No. 2, pp. 343-358.

Lucas, Richard E.; Diener, Ed; and Suh, Eunkook. (1996). "Discriminant validity of well-being measures." *Journal of personality and social psychology*, Vol. 71, No. 3, pp. 616-628.

Luttmer, Erzo FP. (2005). "Neighbors as negatives: relative earnings and well-being," *The Quarterly journal of economics*, Vol. 120, No. 3, pp. 963-1002.

McLanahan, Sara; and Adams, Julia. (1987). "Parenthood and psychological well-being," *Annual review of sociology*, Vol. 13, No. 1, pp. 237-257.

Mature Market Institute (2010). "Market Survey of Long-Term Care Costs," https://www.metlife.com/assets/cao/mmi/publications/studies/2010/mmi-2010-market-survey-long-term-care-costs.pdf. Accessed 8/18/14.

Mature Market Institute (2012). "Market Survey of Long-Term Care Costs," https://www.metlife.com/assets/cao/mmi/publications/studies/2012/studies/mmi-2012-market-survey-long-term-care-costs.pdf. Accessed 8/18/14.

Molzahn, Anita E.; Gallagher, Elaine; and McNulty, Vicki (2009). "Quality of Life Associated with Adult Day Centers," *Journal of Gerontological Nursing,* Vol. 35, No. 8, pp. 37-46.

Nelson, S. Katherine; Kushlev, Kostadin; English, Tammy; Dunn, Elizabeth W.; and Lyubomirsky, Sonja. (2012). "In defense of parenthood: Children are associated with more joy than misery," *Psychological science*, Vol. 24, No. 1, pp. 3-10.

Sörensen, Silvia; Pinquart, Martin; and Duberstein, Paul (2002). "How effective are interventions with caregivers? An updated meta-analysis," *The gerontologist*, Vol. 42, No. 3, pp. 356-372.

Stone, Arthur A.; Schneider, Stefan; Krueger, Alan; Schwartz, Joseph E.; and Deaton, Angus. (2016). "Experiential Wellbeing Data from the American Time Use Survey: Comparisons with Other Methods and Analytic Illustrations with Age and Income," *Social Indicators Research*, pp. 1-20.

Stone, Arthur A.; Schwartz, Joseph E.; Broderick, Joan E.; and Deaton, Angus. (2010). "A snapshot of the age distribution of psychological well-being in the United States," *Proceedings of the National Academy of Sciences*, Vol. 107, No. 22, pp. 9985-9990.

Sussman, Tamara; and Regehr, Cheryl (2009). "The influence of community-based services on the burden of spouses caring for their partners with dementia," *Health & Social Work*, Vol. 34, No. 1, pp. 29-39.

Tyler, Tom R. (2006). "Process utility and help seeking: What do people want from experts?," *Journal of economic psychology*, Vol. 27, No. 3, p. 360-376.

Valadez, Albert; Lumadue, Christine; Gutierrez, Bibiana; and de Vries-Kell, Sabina (2005). "Family caregivers of impoverished Mexican-American women: The perceived impact of adult day care centers," *Families in Society: The Journal of Contemporary Social Services*, Vol. 86, No. 3, pp. 384-392.

Appendix B

Table 2.5: Caregiving Selection Probit Models

Variables	Adult Care Marginal Effect	Sig.	Child Care Marginal Effect	Sig.
Age	-0.0088	**	-0.0196	***
Female	0.0433		0.0610	
Married	0.1561	*	0.3187	***
White	0.0131		-0.0576	
Hispanic	0.0365		0.4195	***
Education (vs. Less than High School)				
High school	0.0683		0.2234	**
Some college	0.1468		-0.0200	
College	-0.2587	*	0.1839	
Advance education	-0.0900		0.2263	
Income Level (vs. Less than $10,000)				
Income $10,000-$20,000	0.2175	*	-0.2725	**
Income $20,000-$30,000	0.1911		0.0301	
Income $30,000-$40,000	0.2661	*	-0.1000	
Income $40,000-$50,000	0.3533	**	-0.0937	
Income $50,000-$60,000	0.2312		0.0677	
Income $60,000-$75,000	0.2451		-0.0453	
Income $75,000-$100,000	0.4026	**	0.1153	
Income $100,000-$150,000	0.4334	**	0.0289	
Income Greater Than $150,000	0.1240		-0.0583	
Number of adults in the household	0.0707		-0.1963	***
Number of children in the household	-0.2413	***	0.8026	***
Region (vs. West)				
Northeast	0.0985		0.0698	
Midwest	0.1241		0.2618	**
South	-0.0335		0.0419	
Weekend diary day (vs. Weekday)	-0.0285		-0.2608	***
Year 2012	0.1717	***	0.0114	
Instrumental variables				
Median annual cost of a private-room nursing home[1]	0.0025		-0.0105	***
Adult Day Services Daily Rate (in $1,000)[2]	-0.4784		6.0708	**
Ratio of the economic value of family caregiving to Medicaid long-term care spending[3]	0.0193		-0.0627	**
Number of private long-term care insurance policies in effect per 1000 people aged 40 and above[3]	-0.0029	**	0.0003	
Value of Medicaid expenditures per person served at nursing facility services[3]	-0.0184	**	0.0195	***

Table 2.5: Caregiving Selection Probit Models (Continued)

Variables	Adult Care		Child Care	
	Marginal Effect	Sig.	Marginal Effect	Sig.
Number of people receiving the Administration for Community Living (ACL) congregate meals per 1000 people aged 65 and above[3]	-0.0006		-0.0056	***
Adjusted Wald test for the joint significant of the instruments				
Prob > F	0.1165		0.0143	**

2010 and 2012 American Time Use Survey (ATUS) and its Well-being Module (WBM). Number of observations is 3,866. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Survey weights were used. Sources: [1] Genworth 2010 and 2012: Cost of Care Survey. [2] 2010 and 2012 Market Survey of Long-Term Care Costs. [3] 2012 Across the States: Profiles of Long-Term Services and Supports

Chapter III

A Panel Study in Caregiving and Life Satisfaction of Older Individuals and Retirees

Abstract

Using data from the 2009, 2013 and 2015 waves of Panel Study of Income Dynamics (PSID) and the associated Disability and Use of Time Supplement (DUST) and Well-being Supplement (WB). This study examines how caregiving affects life satisfaction of older individuals and retirees who are caregivers over time. Due to societal aging, the demand for informal care is likely to increase. Older individuals may provide care to their elderly parents, spouse, children, or grandchildren. Not only may providing care be physically and emotionally demanding, but it also may impact the overall quality of life. Life satisfaction is a global assessment of a person's quality of life. Taking advantage of the panel structure of the data, fixed-effect logistic models are estimated separately by gender to account for endogeneity caused by unobserved heterogeneity of self-selecting into caregiving roles. The results show that over time caring for adults and caring for children are associated positively with the life satisfaction of wives who are at least 50 or older. In addition, caring for children is associated negatively with life satisfaction of both retired husbands and wives while caring for adults is associated positively with life satisfaction of both retired husbands and wives.

Key Words: informal caregiving, subjective well-being, life satisfaction, time use

1. Introduction

Due to the ageing society, the demand for informal care is likely to increase. Older individuals or retirees provide much of the helps. It is estimated that around 43.5 million adults in the U.S. provided unpaid or informal care to an adult or a child in 2014, and more than half of caregivers are individuals aged 50 and older (Greenwald & Associates, 2015). Therefore, older informal caregivers play an important role in caring for both younger and frail older family members. Caregiving is time-consuming and may be burdensome, which could affect quality of life of caregivers. Thus, sound knowledge about the impact of informal care provision on well-being of caregivers is becoming more and more important.

General finding in literature is that caregiving is related negatively to well-being of caregivers. However, most of the literature is based on cross-sectional studies and most studies neglect the issue of endogeneity. This study uses panel data, which may provide more insights into the effect of caregiving on well-being of caregivers, and uses fixed-effect models to account for endogeneity issue caused by unobserved heterogeneity of self-selecting into caregiving roles. The results show that over time caring for adults and caring for children are associated positively with the life satisfaction of wives who are at least 50 or older. In addition, caring for children is associated negatively with life satisfaction of both retired husbands and wives while caring for adults is associated positively with life satisfaction of both retired husbands and wives.

2. Literature Review

2.1 Household Production Model

The conceptual framework of well-being and individual choice of care provision can be illustrated by the household production function developed by Becker (1965). Individuals allocate their limited resource (i.e., time and purchased goods and services) in the most efficient way to produce outputs (i.e., household-produced commodities) with the goal to maximize the sum of process utility and outcome utility. Cooked meals, clean clothes, child well-being, and adult well-being are all examples of household-produced commodities. A production function for a care recipient's well-being can be expressed as:

$$Care\ recipient's\ well-being = W(X,t)$$

where *X* refers to goods and services used in the production of the care recipient's well-being and *t* refers to time spent in caregiving. For example, Barnay and Juin (2016) show that informal care reduces the risk of depression of dependent elderly.

Caregivers not only derive utility (i.e., happiness or satisfaction) from an improvement in the health or well-being of a care recipient, but also from the process of caring itself. The utility function of a caregiver can be expressed as:

$$U\ (W,t)$$

where *W* is care recipient's well-being and *t* is time spent in caregiving. Note that time spent in caregiving (*t*) enters the utility function directly as well as through *W*. The utility or disutility derived while engaging in caregiving activities (*t*) is called "process utility" (Brouwer, 2005; Kalenkoski, 2017; Kalenkoski and Oumtrakool, 2017). Therefore, total utility derived from a commodity includes both process utility and outcome utility. The

household production model suggests that a person will undertake caregiving responsibilities only if it provides net positive utility.

2.2 Evaluative Well-being

 Subjective well-being reflects how individuals feel and think about their entire lives or about specific domains and activities in their lives (Stone and Mackie, 2014). Subjective well-being can be categorized into experienced ("hedonic" or "emotional") well-being and evaluative well-being (i.e., overall life satisfaction) dimensions. Experienced well-being captures individuals' emotional states associated with recent activities, such as momentary positive (e.g., happy and meaningful) and negative (e.g., sad, painful, tired, and stressful) affective states (for example Kalenkoski and Oumtrakool, 2017; Kalenkoski, 2017), whereas evaluative well-being or life satisfaction—the focus of this current study— cognitively reflects individuals' long-term attitudes about or satisfaction with their lives as a whole (National Research Council, 2012). Life satisfaction is also one of the most important factors that define successful aging (Tate et al., 2003; Depp and Jeste, 2006). Lucas and Donnellan (2007) find that life satisfaction is relatively stable over time. Although life satisfaction may change in response to major life events, due to hedonic adaptation, it usually recovers back to a genetically determined set-point after a period of adaptation (Oswald and Powdthavee, 2008). However, Lucas (2007) finds a contradict evidence that for some events, such as marriage and death of a spouse, the adaptation occurs, and life satisfaction recovers back. But for some events, such as divorce and unemployment, life satisfaction is permanently changed.

2.3 Caregiving and Life Satisfaction

      There is a substantial body of cross-sectional studies, which examine the effects of caregiving on the well-being of caregivers. The existing literature has provided mixed evidence, however; most of the studies show that informal caregiving is associated negatively with subjective well-being of caregivers. For example, Pinquart and Sorenson (2003) perform a meta-analysis based on findings from 84 articles that examine differences in the well-being of caregivers providing care for frail older adults and non-caregivers. They find that caregivers have higher levels of stress and depression and lower levels of life satisfaction, positive affect scales, physical health, and self-efficacy than non-caregivers. Another example is a meta-analysis by Grossman and Webb (2016). This study summarizes the findings from 97 articles that examine the impact of caregiving on various aspects of older caregivers. All articles were published between 2005 and 2015. Much of the literature shows that caregivers have higher levels of stress and depression, and mortality risk and lower levels of life satisfaction, positive affect scales, physical health, metal health, and quality of life than non-caregivers.

      The existing literature based on longitudinal data is limited. Most of the literature is based on cross-sectional studies and most studies neglect the issue of endogeneity caused by unobserved heterogeneity of self-selecting into caregiving roles. A few recent studies address the issue using instrumental variable models (see, for example Kalenkoski & Oumtrakool, 2017). The limited literature based on longitudinal data show that there might be positive as well as negative effects on well-being due to caregiving to children and/or adults over time.

Regarding caring for children, the existing literature has provided mixed evidence regarding the effects of child care on the well-being of caregivers. However, the psychosocial and physical health benefits of grandchild care may be more perceptible in the Asian culture than in Western countries. While in Western and American culture, individuals often value independent and get used to supporting role in caring for grandchildren, in Asian culture, it is a social norm that grandparents are culturally expected to assume responsibility of caring for grandchildren. Thus grandparents, who provide child care, may derive utility from social approbation (Kalenkoski, 2017).

Longitudinal studies from the U.S. using either the Health and Retirement Study or the National Survey of Families and Household find custodial grandparenting (i.e., a grandchild lives with grandparent) is associated with elevated depressive symptoms (Szinovacz et al., 1999; Blustein et al., 2004; Musil et al., 2009; Musil et al., 2010), declined life satisfaction (also see Szinovacz et al., 1999), and worst physical health (Musil et al., 2010).

Using data from 1994-2010 German Socio-Economic Panel, Pollmann-Schult (2014) examines the association between parenthood and subjective well-being and shows that parents with children and childless couple have no difference in the levels of satisfaction with their lives. While caring for one's children is a rewarding experience and provides a sense of purpose, these positive effects on life satisfaction are offset by financial costs, time costs, and psychosocial stress.

Di Gessa et al. (2016) use 3 waves of data from the Survey of Health, Ageing and Retirement in Europe and find a positive longitudinal association between grandchild care and physical health of grandmothers only, not grandfathers. Ku et al. (2013) use 4

waves of the Taiwan Longitudinal Study on Aging and find long-term multigenerational caregivers, who provide care for their adult children and/ or grandchildren, are associated with better self-report health, higher life satisfaction and lower level of depression than non-caregivers. Using data from the 2011-2013 China Health and Retirement Longitudinal Study, Xu (2018) examines the mental health consequences from providing cares and finds a consistent evidence that grandparents who care for grandchildren only report greater mental and physical health than non-caregivers. In addition, Hilbrand et al. (2017) analyze data from the longitudinal Berlin Aging Study and find grandparents who provide childcare have longer longevity than grandparents who do not provide childcare.

Regarding caring for adults, the existing literature has provided mixed evidence. Rafnsson et al. (2017) analyze data from 2 waves of the English Longitudinal Study of Ageing, and find spousal or child care is associated with decline in quality of life and increased depression. Using 2001 to 2011 (11 waves) of the Household, Income and Labour in Australia to estimate the impact of informal caregiving on self-reported well-being over time, Van den Berg et al., (2014) find that providing informal adult care has a negative impact on life satisfaction of caregivers.

Using 2 waves of data from the National Survey of Family and Households, Marks et al. (2002) find spousal caregiving is associated with a significant increase in depressive symptoms, but women caregivers who provide nonresidential care to a parent report higher level of sense of purpose in life than non-caregiving women. Xu (2018) finds that the "sandwich" grandparents in China who care for both grandchildren and great-grandparents report greater life satisfaction and lower level of depression than non-caregivers.

Providing caregiving is also associated with other aspects of caregiver's well-being. Studies have shown that caregiving is associated with mortality risk, physical health, and mental health. O'Reilly et al. (2008) examine the health of caregivers in 2001 by following subsequent mortality over the following four years and find that caregivers have lower mortality risks than non-caregivers. These impacts are more pronounced for women, older individuals, and those reporting poorer health at the beginning of the study (also see Caputo et al. (2016)).

Whether care recipients reside with caregiver also affects well-being of caregivers. Kaschowitz and Brandt (2017) perform a longitudinal study and find caregivers who provide residential care report worse health, and caregivers who provide nonresidential care report better health than non-caregivers do. However, De Zwart et al. (2016) find the health effects has short-lived. The prolonged caregiving more than 4 or 7 years is not associated with the health of caregivers.

Kaschowitz and Brandt (2017) find caregivers who provide residential care report a decline in mental health (also see Hiel et al., (2015). Schmitz and Westphal (2015) also find a negative short-term impact of informal care on mental health of caregivers, but the effect fades out after 5 years of care provision. In addition, using 3 waves of Health and Retirement Study, Sneed and Schulz (2017) find grandparent caregiving is associated with better cognitive function.

The current study contributes to the limited longitudinal literature on the impact of informal caregiving on the well-being of caregivers in several ways. While other studies estimate a fixed-effect model, differencing out factors that do not vary over time, such as gender, this study also uses the fixed-effect model, but estimate it separately by

gender to account for the differences in the time use by gender. Other studies focus on other aspects of well-being using self-report physical health, level of depression, mortality risk, and mental health as a measure of caregivers' well-being. This study focuses on evaluative well-being measured by life satisfaction, which is a measure of overall quality of life.

3. Method

3.1 Data

This study uses data from 2009, 2013 and 2015 waves of the Panel Study of Income Dynamics (PSID), 2009 and 2013 waves of Disability and Use of Time (DUST) supplement, and 2016 wave of Well-Being and Daily Life supplement (PSID-WB). PSID is a panel survey of a nationally representative sample of US individuals and their families. PSID collects long-term measure of health, economic wellbeing, and household information. DUST is a supplemental study collecting data on disability, time use, and well-being of older adults. DUST sample included couples in which both spouses were at least 50 or older and at least one member of the couple was 60 or older. Respondents completed up to two time diaries each, covering the period between 4:00 am on the day before the interview and 4:00 am on the interview day. Respondents provided information on what they were doing, how long the activity lasted, where they were, who they were doing the activity with and who else was there. Respondents reported their momentary well-being during three randomly selected activities, and reported their life satisfaction. The wellbeing supplement collects information on wellbeing, personality traits, and every day skills from a household head or spouse/partner in the 2015 Main PSID.

This study examines older couple sample who are at least 50 or older, whether working or not. The final sample was reached by including only respondents who participated in both 2009 and 2013 DUST, and 2016 PSID-WB and by deleting respondents with missing life satisfaction or demographic information. The sample includes 414 respondents who participated in all 3 survey years. Thus, total observation is 1,242 observations. It is a balanced panel. Respondents' information on marital status, gender, race, education, retirement status, income level, and net worth were obtained from PSID. Respondents' information on life satisfaction, caregiving activities, age, and diary day were from DUST and PSID-WB. DUST survey weights were used to adjust the sample to be nationally representative.

Dependent Variables

Life satisfaction is a global assessment of a person's quality of life. An individual's subjective well-being is measured with a global question on life satisfaction (Campbell et al., 1976): "Please think about your life as a whole. How satisfied are you with it?" There are 5 response options ranging from completely satisfied (1) to not at all satisfied (5). For purpose of this study, the variable is reverse-coded so that higher values are associated with higher levels of well-being (completely satisfied (5), very satisfied (4), somewhat satisfied (3), not very satisfied (2), to not at all satisfied (1)). From table 3.1, the sample average of life satisfaction is 3.89 with a median of 4.00.[7] Due to lack of variations and a small number of observations of the responses of 1 and 2, which account for almost 6% of sample, the life satisfaction response is grouped into two categories:

---

[7] Life satisfaction score ranges from 1 to 5 and accounts 1.30, 4.70, 22.51, 48.34, and 23.16 percent of sample respectively.

"satisfied" and "not satisfied" with your life as a whole. Thus, the life satisfaction is a dichotomous variable. If the response is less than or equal to 4, it is classified as "not satisfied" with a code of 0. If the response equals to 5, it is classified as "satisfied" with a code of 1.

Independent Variables

The key explanatory variables are indicators for the two types of caregiving that are examined in this paper: caring for adults, and caring for children or grandchildren. These variables are dichotomous with a code of 1 if the respondent reports time spent on the type of care in DUST or answers "Yes" to the following question in PSID-WB: "Which of the following care activities did you do yesterday? 1. Took care of a child 2. Took care of another adult" and with a code of 0 if no time is spent or the answer is "No". Due to the nature of questions asked in the survey, it is not possible to identify whether recipients of care reside or not reside with caregivers.

Household characteristics and economic circumstances are included to control for time varving factors that are likely to be related to life satisfaction. Control variables include age, gender, marital status, race, education level, income level, net worth, retirement status, and diary day.

Marital status, gender, race, diary day, and retirement status are dummy variables. Well-being is related negatively to being single (Pinquart and Sörensen, 2000; Gerdtham and Johannesson, 2001; Helliwell, 2003) and to being male (Alesina et al., 2004; Gerdtham and Johannesson, 2001). There is also a gender difference in life satisfaction between caregivers who provide care to residential parents. Marks et al. (2002) show that care provided by men to residential parents is associated positively with life satisfaction

while care provided by women to residential parents is associated negatively with life satisfaction. If a respondent is married, the married variable is coded as 1 and as 0 otherwise. If a respondent is female, the female variable is coded as 1 and as 0 otherwise. Dolan et al, 2016 find that blacks are less happy and report lower life satisfaction than whites (also see Campbell et al., 1976; Blanchflower and Oswald, 2004 and 2008). If a respondent is white, the white variable is coded as 1 and as 0 otherwise. Stone et al., (2012) show a day-of-the-week effect on well-being. People report more positive emotions and less negative emotions on weekends than on weekdays (also see Helliwell and Wang, 2014). In retirement, retirees have more available time on both weekdays and weekends. Therefore, the day-of-week effect diminishes for older and retired individuals (Stone et al., 2012). If a respondent is interviewed on weekends, the weekend variable is coded as 1 and as 0 otherwise.

One of the life events that may affect the life satisfaction of old aged individuals is retirement. However, the existing literature has provided mixed evidence regarding the effects of retirement on the well-being of retirees. Bosses et al. (1987) find retirees are associated with lower life satisfaction than workers. Using the 1985 - 2003 German Socioeconomic Panel, Pinquart and Schindler (2007) find 3 patterns of change in life satisfaction during the retirement transition, but most individuals experience a small decline in life satisfaction over time. How retirement decision occurs also affects well-being of retirees. Bonsang and Klein (2012) conduct a longitudinal study and find that voluntary retirement has a small positive effect on life satisfaction while involuntary retirement has negative effect on life satisfaction. Retirees are defined as individuals who,

at the time of the survey, reported being retired, didn't look for job, and didn't work for pay. The retirement variable is coded as 1 if a respondnet is retired, and as 0 otherwise.

Education information is included as a continuous variable that represents the actual grade of school completed. The response ranges from 1 to 17. For example, a value of 6 indicates that the respondent completed the sixth grade by the time of the interview. Education level attained is associated positively with life satisfaction level (Gerdtham and Johannesson, 2001; Blanchflower and Oswald, 2004).

The relation between age and well-being has been studied extensively. A common finding is that age and well-being have a U-shaped relation, with well-being being lowest in the 40's and 50's (Blanchflower & Oswald, 2004, 2008; Gerdtham & Johannesson, 2001). However, a number of studies find different patterns (Frijters & Beatton, 2012; Lucas & Donnellan, 2007). Age of respondent is a continuous variable.

Standard economic theory predicts that income and net worth, which is a proxy for financial well-being, positively relates to overall well-being because financial well-being is a subcomponent of overall well-being. Income is found to be correlated positively with life satisfaction (Deaton, 2007; Kahneman & Deaton, 2010; Sacks et al., 2012; Bonsang and Klein, 2012). There is a distinction between positive and negative well-being (Huppert and Whittington (2003). Using German panel data, Boes and Winkelmann (2010) add that income has only a minor positive effect on life satisfaction, but significantly reduce dissatisfaction. Net worth or wealth is also associated with life satisfaction (Headey and Wooden, 2004). Using panel data from five countries, net worth is associated positively with life satisfaction. Furthermore, the effect of net worth on life satisfaction is more pronounced than income (Headey et al., 2008). Income and

net worth are adjusted by CPI-U into constant dollars in 2015 term. Income variable is scaled by 1,000. Net worth is sacaled by 10,000.

Table 3.1 provides descriptive statistics for all the variables used in the analysis. Regarding adults aged 50 and older (column 1), on average, the individuals report a life satisfaction score of 3.88. The response on life satisfaction question of 3 means "somewhat satisfied" and a response of 4 means "very satisfied" with their quality of life. Thus, older individuals appear to be moderately satisfied with their quality of life in general. This is consistent with other longitudinal studies that also examine the effect of caregiving on mental health (Van den Berg et al., 2014; Hajek and König, 2018; Xu, 2018). 72.33% of older individuals are satisfied with their life. 15.36% of older individuals report caring for children on their diary day and 20.03% report caring for adults. 94.98% are married. The average age is 71. 52.46% are female. 92.72% are white. 7.79% have less than high school education. 34.51% attain high school. 22.29% attain some college education. 35.41% attain a college degree. 55.55% are retired. 41.68% complete the survey during the weekend. The average income and net worth are $88,234 and $1,243,331 respectively. Breaking down the sample into husbands and wives (column 2 and 3), both husbands and wives appear to be fairly satisfied with their quality of life. Husbands and wives report the average life satisfaction score of 3.89 and 3.87 respectively. As a result, 74% of husbands and 71% of wives report that they are satisfied with life. However, there are no statistical differences in the life satisfaction score and the percentage of who report satisfied with their life between husbands and wives. Wives provide both types of caregiving statistically higher than husbands do. 19% of wives report caring for children while only 11% of husbands report providing the

type of care. Almost 22% of wives report caring for adults while only 18% of husbands report providing the type of care.

Table 3.2 represents how life satisfaction differs depending on gender and older individuals' engagement in different categories of care. Regarding caring for children, a greater percentage of husbands who care for children report that they are satisfied with life than those who do not care for children (87.61% vs 72.39%). However, there is no statistical difference between wives who care for children and who do not. Regarding caring for adults, a lower percentage of husbands who care for adults report that they are satisfied with life than those who do not care for adults (65.92% vs 75.88%). However, there is no statistical difference between wives who care for adults and who do not.

Table 3.3 represents how life satisfaction differs depending on gender and retirees' engagement in different categories of care. For both retired husbands and wives, there is no statistical difference between those who care for children and who do not. Regarding caring for adults, a greater percentage of retired wives who care for adults report that they are satisfied with life than wives who do not provide the care (75.02% vs 66.29%). However, there is no statistical difference between retired husbands who care for adults and who do not.

Table 3.4 presents transition probabilities of older individuals from providing cares to not providing cares and vice versa. It shows the change in one categorical variable over time. The rows report the initial values, and the columns report the final values. Regarding caring for children, in each year almost 90 percent of those who do not care for children remains not providing the care in the next year, and the remaining 10 percent starts providing the care in the next year. However, only 27 percent of those

who care for children remains providing the care in the next year, and those who care for

children has 72 percent change of stopping providing the care in the next year.

Regarding caring for adults, in each year those who do not care for adults have only 16

percent chance to start providing the care in the next year, and those who care for adults

have only 38 percent chance of remaining the care providers in the next year. All in all, it

is more likely for older individuals to stop providing cares or remain not providing cares

than to start or remain providing cares. Regarding life satisfaction, those who are not

satisfied with their life have only 36 percent chance of becoming satisfied with their life

in the next year, but those who are satisfied with their life have almost 82 percent chance

of remaining satisfied in the next year. Thus, life satisfaction is relatively stable over

time.

Table 3.5 is similar to table 3.4 but the sample is retirees. The results show

similar patterns that it is more likely for retirees to stop providing cares or remain not

providing cares than to start or remain providing cares. Life satisfaction is relatively

stable over time. Those who are not satisfied with their life have 67 percent chance of

remaining not satisfied with their life in the next year, and those who are satisfied with

their life have almost 80 percent chance of remaining satisfied with their life in the next

year.

3.2 Model

In modelling life satisfaction, it is possible that respondents with a higher life

satisfaction may be more likely to select themselves into caregiving roles than

respondents with lower life satisfaction because they are happier with their life.

Similarly, respondents who provide caregiving may derive net positive utility from the

activity and feel more satisfied with their life as a whole than non-caregivers. This self-selecting can cause endogeneity problem, and as a result, the estimates of key explanatory variables (types of caregiving) will be biased.

Panel data and within estimation through fixed-effect model can remedy the problem of endogeneity caused by unobserved heterogeneity of self-selecting into caregiving roles. Fix-effect model uses only within-subject information to estimate the regression parameters. It assesses whether within-person changes in caregiving are associated with within-person changes in life satisfaction, and thus control for all unobserved time-invariant factors (e.g., cognitive ability, personality, levels of depression, pre-existing health, and gender) that correlate with both life satisfaction and caregiving.

Given that data are panel data and the dependent variable is a dichotomous variable of life satisfaction, a fixed-effect logistic model is utilized to reduce bias due to selection into caregiving. The following model investigates the effects of caregiving on life satisfaction for individual *i* and period *t*.

$$LS_{it}^* = \alpha_0 + \alpha_1 C_{Ait} + \alpha_2 C_{Cit} + \alpha_3 X_{it} + a_{it} \tag{1}$$

$$LS_{it} \quad = 1 \text{ if } LS_{it}^* > 0$$

$$LS_{it} \quad = 0 \text{ if } LS_{it}^* < 0$$

$$t = 1, \dots, 3; \ i = 1, \dots, N$$

LS_{it}^* is the latent evaluative well-being of respondent$_i$ at time$_t$, which is measured with the observed life satisfaction (LS_{it}). C_{Ait}, and C_{Cit} are indicators for whether the person cares for an adult, or a child, respectively, on the diary day. X_{it} is a vector of observed person-level characteristics with a_{it} being the error term and the alphas being the

coefficients to be estimated. The model estimates the likelihood that person i will be satisfied with his or her life as a whole.

Even though race, gender, and education level are determinants of life satisfaction, they are differenced out of the model because they do not vary over time. The other time-varying confounding variables are included in the model, including age, marital status, retirement status, income, net worth, diary day, and year.

The time use literature as well as Becker's theory regarding the allocation of time suggest that men and women use their time differently. For example, more wives are caregivers to spouses than husbands, and daughters are twice as likely as sons to provide care for parents (Stone, et al., 1987). In addition, a meta-analysis integrates results from 229 studies finds female caregivers are typically report higher levels of caregiving tasks, more hours of care provided, and lower levels of subjective well-being than male caregivers (Pinquart and Sorensen, 2006). In retirement, individuals are no longer engaged in the labor market. Thus, retirees have more available time than non-retirees to participate in leisure and household work, such as child care for a grandchild or the care for a sick spouse. Kalenkoski and Oumtrakool (2014) find differences in how male and female, and workers and retirees spent time in personal care, leisure, and household production activities. Therefore, one model includes all older individuals who are at least 50 or older and is estimated separately by gender, and the other model includes only retired respondents and is estimated separately by gender.

4. Results

The main models are estimated using a fixed-effect logistic regression, which the estimated coefficients are often difficult to interpret from a practical standpoint. Thus, table 3.6 reports the marginal effects of each of the different types of caregiving activities on the probability of reporting satisfied with their life of adults aged 50 and older. For wives, decision to provide care for children and care for adults increase the probability of the person reporting satisfied with life by 0.0011 and 0.0015 respectively. The effects are small, but still statistically significant and show that decisions to provide both types of caregiving are associated positively with the probability of reporting satisfied with life of the wives. Caregiving of all types is not a statistically significant predictor of husbands' life satisfaction. Age and being retired are associated negatively with life satisfaction of wives, but are not related to husbands' life satisfaction. Income level is associated positively with life satisfaction of wives, but with that of husbands. Being married, diary day, and net worth are not statistically significant.

Table 3.7 reports the marginal effects of each of the different types of caregiving activities on the probability of reporting satisfied with their life of retirees. Caring for children is associated negatively with life satisfaction of both husbands and wives. Decision to provide care for children decreases the probability of husbands and wives reporting satisfied with life by 0.0020 and 0.0006 respectively. However, caring for adults is associated positively with life satisfaction of both husbands and wives. Decision to provide care for adults increases the probability of husbands and wives reporting satisfied with life by 0.0009 and 0.0010 respectively. The effects are small, but still statistically significant and show that a different type of caregiving has a different

association with life satisfaction of caregivers. Being married is associated positively with life satisfaction of wives, but not with that of husbands. Age is related negatively with life satisfaction of both husbands and wives. Income and net worth are related positively with life satisfaction of both husbands and wives, but the effects are small.

5. Conclusion

This study uses 3 waves of panel data from PSID and its supplement modules to examine how caring for adults and children affects the overall well-being of older individuals and retirees who provide care for others. This study contributes to the limited empirical evidence based on panel data on the topic. The results suggest that both types of care for children and care for adults are associated positively with life satisfaction of the wives who are at least 50 or older. Because retirees are no longer engaged in the labor market, thus, retirees have more available time than non-retirees to participate in leisure and household work. They become main informal caregivers for both younger and frail older family members. Therefore, it is interesting to specifically examine retiree sample. The results show that caring for children is associated negatively with life satisfaction of both retired husbands and wives while caring for adults is associated positively with life satisfaction of both retired husbands and wives. The differences in the effect of caring for children on life satisfaction of older individuals and retirees may be due to the declining in health status of retirees. The finding of negative association of caring for children and positive association of caring for adults with well-being of caregivers are consistent with prior longitudinal studies (for example, Szinovacz et al., 1999; Marks et al., 2002; Blustein et al., 2004; Musil et al., 2009; Musil et al., 2010; Xu, 2018).

Table 3.1: Descriptive Statistics

Variables	All Respondents		Husbands		Wives		Sig.
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	
Life Satisfaction Score (ranges from 1 (not satisfied) to 5 (very satisfied))	3.8858	0.0033	3.8968	0.0048	3.8758	0.0046	
Satisfied with Life (= 1 if LS ≥ 4; 0 otherwise)	0.7233	0.0017	0.7393	0.0025	0.7088	0.0024	
Caregiving							
Care for Children	0.1536	0.0014	0.1093	0.0017	0.1937	0.0021	***
Care for Adults	0.2003	0.0015	0.1811	0.0022	0.2177	0.0022	*
Married	0.9498	0.0008	0.9810	0.0008	0.9215	0.0014	***
Age	70.9455	0.0304	72.4936	0.0441	69.5427	0.0404	***
Female	0.5246	0.0019	0.0000	(omitted)	1.0000	0.0000	
White	0.9272	0.0010	0.9265	0.0015	0.9279	0.0014	
Education							
Less than high school	0.0779	0.0010	0.0595	0.0013	0.0946	0.0016	
High school	0.3451	0.0018	0.2794	0.0025	0.4047	0.0026	***
Some college	0.2229	0.0016	0.2125	0.0023	0.2323	0.0023	
College	0.3541	0.0018	0.4486	0.0028	0.2684	0.0024	***
Retired	0.5555	0.0019	0.6063	0.0027	0.5095	0.0027	***
Weekend Diary Day	0.4168	0.0019	0.4067	0.0028	0.4260	0.0026	
Income (2015 dollars)	88,234	306	91,673	452	85,118	414	
Net worth in (2015 dollars)	1,243,331	23,598	1,318,303	35,037	1,175,392	31,862	
Number of respondents	414		194		220		
Time periods	3		3		3		
Number of observations	1,242		582		660		

2009, 2013, and 2015 PSID and its supplement modules (DUST and WB modules). Survey weights are used.
* Husbands and wives are statistically different at the 90% confidence level.
** Husbands and wives are statistically different at the 95% confidence level.
*** Husbands and wives are statistically different at the 99% confidence level.

Table 3.2: Older Individuals' percent reporting satisfied with life by Caregiving Activities (Age > 50)

Variables	Husbands		Wives	
	Satisfied with life	Sig.	Satisfied with life	Sig.
Care for Children	0.8761	*	0.7748	
Not Care for Children	0.7239		0.6950	
Care for Adults	0.6592	*	0.7442	
Not Care for Adults	0.7588		0.7010	

2009, 2013, and 2015 PSID and its supplement modules (DUST and WB modules).
Number of observations is 1,242. Survey weights are used.

Table 3.3: Retirees' percent reporting satisfied with life by Caregiving Activities

Variables	Husbands		Wives	
	Satisfied with life	Sig.	Satisfied with life	Sig.
Care for Children	0.8527		0.7149	
Not Care for Children	0.6953		0.6754	
Care for Adults	0.6706		0.7502	*
Not Care for Adults	0.7216		0.6629	

2009, 2013, and 2015 PSID and its supplement modules (DUST and WB modules).
Number of observations is 666. Survey weights are used.
* Husbands and wives are statistically different at the 90% confidence level.
** Husbands and wives are statistically different at the 95% confidence level.
*** Husbands and wives are statistically different at the 99% confidence level.

Table 3.4: Older Individuals' Caregiving Transition Probabilities

Variables	No (= 0)	Yes (= 1)
Not Care for Children	0.8924	0.1076
Care for Children	0.7229	0.2771
Not Care for Adults	0.8384	0.1616
Care for Adults	0.6190	0.3810
Not Satisfied with Life	0.6341	0.3659
Satisfied with Life	0.1830	0.8170

2009, 2013, and 2015 PSID and its supplement modules (DUST and WB modules).
Number of observations is 1,242.

Table 3.5: Retirees' Caregiving Transition Probabilities

Variables	No (= 0)	Yes (= 1)
Not Care for Children	0.9424	0.0576
Care for Children	0.8000	0.2000
Not Care for Adults	0.8375	0.1625
Care for Adults	0.5556	0.4444
Not Satisfied with Life	0.6667	0.3333
Satisfied with Life	0.2045	0.7955

2009, 2013, and 2015 PSID and its supplement modules (DUST and WB modules).
Number of observations is 666.

Table 3.6: Effects of Caregiving on Older Individual's Life Satisfaction

Variables	Husbands		Wives	
	Marginal Effect	Sig.	Marginal Effect	Sig.
Caregiving				
Care of Children	0.00014		0.00110	***
	(0.0006)		(0.0001)	
Care of Adults	-0.00007		0.00147	***
	(0.0003)		(0.0001)	
Married (vs. Unmarried)	0.00002		-0.00018	
	(0.0001)		(0.0002)	
Age	-0.00002		-0.00122	***
	(0.0001)		(0.0001)	
Retired (vs. Not retired)	-0.00013		-0.00208	***
	(0.0006)		(0.0001)	
Real Income ($1K)	0.00000		0.00001	***
	(0.0000)		(0.0000)	
Real Net Worth ($10K)	0.00000		0.00000	
	(0.0000)		(0.0000)	
Weekend diary day (vs. Weekday)	-0.00002		-0.00001	
	(0.0001)		(0.0001)	
2013 year	0.00020		0.00580	***
	(0.0009)		(0.0004)	
2015 year	0.00007		0.00734	***
	(0.0002)		(0.0008)	

A fixed-effect logistic model. 2009, 2013, and 2015 PSID and its supplement modules (DUST and WB modules). Number of observations is 470. Survey weights are used. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Race, and attained education level are included in the model, but they are differenced out of the model.

Table 3.7: Effects of Caregiving on Retiree's Life Satisfaction

Variables	Retired Husbands		Retired Wives	
	Marginal Effect	Sig.	Marginal Effect	Sig.
Caregiving				
Care of Children	-0.0020	***	-0.0006	***
	(0.0003)		(0.0001)	
Care of Adults	0.0009	***	0.0010	***
	(0.0002)		(0.0001)	
Married (vs. Unmarried)	0.0008		0.0007	***
	(0.0006)		(0.0002)	
Age	-0.0041	***	-0.0006	***
	(0.0000)		(0.0002)	
Real Income ($1K)	0.0000	***	0.0000	***
	(0.0000)		(0.0000)	
Real Net Worth ($10K)	0.0000	***	0.0000	***
	(0.0000)		(0.0000)	
Weekend diary day (vs. Weekday)	-0.0003	*	0.0001	*
	(0.0002)		(0.0001)	
2013 year	0.0181	***	0.0031	***
	(0.0003)		(0.0007)	
2015 year	0.0240	***	0.0035	**
	(0.0002)		(0.0014)	

A fixed-effect logistic model. 2009, 2013, and 2015 PSID and its supplement modules (DUST and WB modules). Number of observations is 214. Survey weights are used. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Race, and attained education level are included in the model, but they are differenced out of the model.

Reference

Alesina, Alberto; Di Tella, Rafael; and MacCulloch, Robert (2004). "Inequality and happiness: are Europeans and Americans different?," *Journal of Public Economics*, Vol. 88, No. 9, pp. 2009-2042.

Barnay, Thomas; and Juin, Sandrine. (2016). "Does home care for dependent elderly people improve their mental health?." *Journal of health economics*, Vol. 45, pp. 149-160.

Becker, Gary S. (1965). "A Theory of the Allocation of Time," *The Economic Journal*, 75(299), 493-517.

Blanchflower, David G.; and Oswald, Andrew J. (2004). "Well-being over time in Britain and the USA," *Journal of public economics*, 88(7), 1359-1386.

_____ (2008). "Is well-being U-shaped over the life cycle?" *Social science & medicine*, Vol. 66, No. 8, pp. 1733-1749.

Blustein, Jan; Chan, Sewin; and Guanais, Frederico C. (2004). "Elevated depressive symptoms among caregiving grandparents." *Health Services Research*, Vol. 39, No. 6, pp. 1671-1690.

Boes, Stefan; and Winkelmann, Rainer. (2010). "The effect of income on general life satisfaction and dissatisfaction." *Social Indicators Research*, Vol. 95, No. 1, pp. 111-128.

Bonsang, Eric; and Klein, Tobias J. (2012). "Retirement and subjective well-being." *Journal of Economic Behavior & Organization*, Vol. 83, No. 3, pp. 311-329.

Bossé, Raymond; Aldwin, Carolyn M.; Levenson, Michael R.; and Ekerdt, David J. (1987). "Mental health differences among retirees and workers: Findings from the normative aging study." *Psychology and aging*, Vol. 2, No. 4, pp. 383.

Brouwer, Werner BF; van Exel , N. Job A.; Van den Berg , Bernard; Van den Bos, Geertruidis AM; and Koopmanschap, Marc A. (2005). "Process utility from providing informal care: the benefit of caring," *Health policy*, Vol. 74, No. 1, pp. 85-99.

Campbell, Angus; Converse, Philip E.; and Rodgers, Willard. (1976). "The Quality of American Life: Perceptions, Evaluations, and Satisfactions." New York: Russell, Sage Foundation.

Caputo, Jennifer; Pavalko, Eliza K.; and Hardy, Melissa A. (2016). "The Long-Term Effects of Caregiving on Women's Health and Mortality." *Journal of Marriage and Family*, Vol. 78, No. 5, pp. 1382-1398.

Charles, Kerwin Kofi. (2004). "Is retirement depressing? Labor force inactivity and psychological well-being in later life." *Research in Labor Economics*, Vol. 23, pp. 269–299.

Deaton, Angus (2007). "Income, aging, health and wellbeing around the world: Evidence from the Gallup World Poll." *Journal of Economic Perspectives*, Vol. 22, pp. 53-72.

De Zwart P.L.; Bakx, P.; Van Doorslaer, E.K.A. (2017). "Will you still need me, will you still feed me when I'm 64? The health impact of caregiving to one's spouse." *Health Economics*, Vol. 26, S. 2, pp. 127–138.

Depp, Colin A., and Dilip V. Jeste (2009). "Definitions and predictors of successful aging: a comprehensive review of larger quantitative studies." *American Association for Geriatric Psychiatry* 14(1), pp. 6-20.

Di Gessa, Giorgio; Glaser, Karen; and Tinker, Anthea. (2016). "The impact of caring for grandchildren on the health of grandparents in Europe: A lifecourse approach." *Social Science & Medicine*, Vol. 152, pp. 166-175.

Dolan, Paul; Kudrna, Laura; and Stone, Arthur 920160. "The measure matters: an investigation of evaluative and experience-based measures of wellbeing in time use data." *Social Indicators Research*, pp. 1-17.

Frijters, Paul; and Beatton, Tony. (2012). "The mystery of the U-shaped relationship between happiness and age." *Journal of Economic Behavior & Organization*, Vol. 82, No. 2-3, pp.525-542.

Gerdtham, Ulf-G; and Johannesson, Magnus (2001). "The relationship between happiness, health, and socio-economic factors: results based on Swedish microdata." *The Journal of Socio-Economics*, Vol. 30, No. 6, pp. 553-557.

Greenwald & Associates (2015). "Caregiving in the U.S. 2015," *National Alliance for Caregiving and the AARP Public Policy Institute*.

Grossman, Brian R., & Webb, Catherine E. (2016). "Family support in late life: A review of the literature on aging, disability, and family caregiving." *Journal of Family Social Work,* Vol. 19, No. 4, pp. 348-395.

Hajek, André; and König, Hans-Helmut. (2018). "The relation between personality, informal caregiving, life satisfaction and health-related quality of life: evidence of a longitudinal study." *Quality of Life Research*, Vol. 27, No. 5, pp. 1249-1256.

Headey, Bruce; Muffels, Ruud; and Wooden, Mark. (2008) "Money does not buy happiness: Or does it? A reassessment based on the combined effects of wealth, income and consumption." *Social Indicators Research*, Vol. 87, No. 1, pp. 65-82.

Headey, Bruce; and Wooden, Mark. (2004). "The effects of wealth and income on subjective well-being and ill-being." *Economic record*, Vol. 80, pp. S24-S33.

Helliwell, John F. (2003). "How's life? Combining individual and national variables to explain subjective well-being," *Economic Modelling*, Vol. 20, No. 2, pp. 331-360.

Helliwell, John F.; and Wang, Shun. (2014). "Weekends and subjective well-being." *Social indicators research*. Vol. 116, No. 2, pp. 389-407.

Hiel, Laura; Beenackers, Mariëlle A.; Renders, Carry M.; Robroek, Suzan J.W.; Burdorf, Alex; and Croezen, Simone. (2015). "Providing personal informal care to older European adults: Should we care about the caregivers' health?." *Preventive medicine*, Vol. 70, pp. 64-68.

Hilbrand, Sonja; Coall, David A.; Gerstorf, Denis; and Hertwig, Ralph. (2017). "Caregiving within and beyond the family is associated with lower mortality for the caregiver: A prospective study." *Evolution and Human Behavior*, Vol. 38, No. 3, pp. 397-403.

Huppert, Felicia A.; and Whittington, Joyce E. (2003). "Evidence for the independence of positive and negative well-being: Implications for quality of life assessment." *British journal of health psychology*, Vol. 8, No. 1, pp. 107-122.

Kahneman, Daniel; and Deaton. Angus. (2010). ""High income improves evaluation of life but not emotional well-being," *Proceedings of the national academy of sciences*, Vol. 107, No. 38, pp. 16489-16493.

Kalenkoski, Charlene M., & Oumtrakool, Eakamon (2014). "How Retirees Spend Their Time: Helping Client Set Realistic Income Goals," *Journal of Financial Planning*, Vol. 27, No. 10, pp. 48-53.

Kalenkoski, Charlene M. (2017). "*Caregiving by Older Adults: Gender Differences in Well-being*," in Gender and Time Use in a Global Context: The Economics of Employment and Unpaid Labor, edited by Rachel Connelly and Ebru Kangar, Palgrave Macmillan.

Kalenkoski, Charlene M., & Oumtrakool, Eakamon. (2017). "The caregiving responsibilities of retirees: what are they and how do they affect retirees' well-being?." *Applied Economics*, Vol. 49, No. 13, pp. 1298-1310.

Kaschowitz, Judith, & Brandt, Martina. (2017). "Health effects of informal caregiving across Europe: A longitudinal approach." *Social Science & Medicine*, Vol. 173, pp. 72-80.

Ku, Li-Jung E.; Stearns, Sally C.; Van Houtven, Courtney H.; Lee, Shoou-Yih D.; Dilworth-Anderson, Peggye; and Konrad, Thomas R. (2013). "Impact of caring for grandchildren on the health of grandparents in Taiwan." *Journals of*

Gerontology Series B: Psychological Sciences and Social Sciences, Vol. 68, No. 6, pp. 1009-1021.

Lucas, Richard E. (2007). "Adaptation and the set-point model of subjective well-being: Does happiness change after major life events?." *Current Directions in Psychological Science*, Vol. 16, No. 2, pp. 75-79.

Lucas, Richard E.; and Donnellan, M. Brent. (2007). "How stable is happiness? Using the STARTS model to estimate the stability of life satisfaction." *Journal of research in personality*, Vol. 41, No. 5, pp. 1091-1098.

Marks, Nadine F.; Lambert, James D.; and Choi, Heejeong (2002). "Transitions to Caregiving, Gender, and Psychological Well-Being: A Prospective US National Study," *Journal of Marriage and Family*, Vol. 64. No. 3, pp. 657-667.

Musil, Carol; Warner, Camille; Zauszniewski, Jaclene; Wykle, May; and Standing, Theresa. (2009). "Grandmother caregiving, family stress and strain, and depressive symptoms." *Western Journal of Nursing Research*, Vol. 31, No. 3, pp. 389-408.

Musil, Carol M.; Gordon, Nahida L.; Warner, Camille B.; Zauszniewski, Jaclene A.; Standing, Theresa; and Wykle, May. (2010). "Grandmothers and caregiving to grandchildren: Continuity, change, and outcomes over 24 months." *The Gerontologist*, Vol. 51, No. 1, pp. 86-100.

O'Reilly, Dermot; Connolly, Sheelah; Rosato, Michael; and Patterson, Chris. (2008). "Is caring associated with an increased risk of mortality? A longitudinal study." *Social science & medicine*, Vol. 67, No. 8, pp. 1282-1290.

Oswald, Andrew J.; and Powdthavee, Nattavudh (2008). "Does happiness adapt? A longitudinal study of disability with implications for economists and judges," *Journal of public economics*, Vol. 92, No. 5, pp. 1061-1077.

Pinquart, Martin; and Schindler, Ines. (2007). "Changes of life satisfaction in the transition to retirement: a latent-class approach." *Psychology and aging*, Vol. 22, No. 3, pp. 442.

Pinquart, Martin, and Silvia Sörensen (2000). "Influences of socioeconomic status, social network, and competence on subjective well-being in later life: A meta-analysis." *Psychology And Aging*. Vol. 15, No. 2, pp. 187-224.

_____ (2003). "Differences between Caregivers and Noncaregivers in Psychological Health and Physical Health: A Meta-Analysis," *Psychology and Aging*, Vol. 18, No. 2, pp. 250-267.

_____(2006). "Gender differences in caregiver stressors, social resources, and health: An updated meta-analysis." Vol. 61, No. 1, pp. 33-P45.

Rafnsson, Snorri Bjorn; Shankar, Aparna; and Steptoe, Andrew. (2017). "Informal caregiving transitions, subjective well-being and depressed mood: Findings from the English Longitudinal Study of Ageing." *Aging & mental health*, Vol. 21, No. 1, pp. 104-112.

Sacks, Daniel W.; Stevenson, Betsey; and Wolfers, Justin. (2012). "The new stylized facts about income and subjective well-being," *Emotion*, Vol. 12, No. 6, pp. 1181-1187.

Schmitz, Hendrik; and Westphal, Matthias. (2015). "Short-and medium-term effects of informal care provision on female caregivers' health." *Journal of health economics*, Vol. 42, pp. 174-185.

Sneed, Rodlescia S.; and Schulz, Richard. (2017). "Grandparent Caregiving, Race, and Cognitive Functioning in a Population-Based Sample of Older Adults." *Journal of aging and health*, 0898264317733362.

Stone, Robyn; Cafferata, Gail Lee; and Sangl, Judith. (1987). "Caregivers of the frail elderly: A national profile." *The Gerontologist*, Vol. 27, No. 5, pp. 616-626.

Stone, Arthur A., and Mackie, Christopher. (Eds.). (2014). "Subjective well-being: Measuring happiness, suffering, and other dimensions of experience," *National Academies Press*.

Szinovacz, Maximiliane E.; DeViney, Stanley; and Atkinson, Maxine P. (1999). "Effects of surrogate parenting on grandparents' well-being." *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, Vol. 54, No. 6, pp. 376-S388.

Tate, Robert B., Leedine Lah, and T. Edward Cuddy (2003). "Definition of successful aging by elderly Canadian males: The Manitoba follow-up study." *The Gerontologist*, *43*(5), pp. 735-744.

Van den Berg, Bernard; Fiebig, Denzil G.; and Hall, Jane. (2014). "Well-being losses due to care-giving." *Journal of health economics*, Vol. 35, pp. 123-131.

Xu, Hongwei. (2018). "Physical and mental health of Chinese grandparents caring for grandchildren and great-grandparents." *Social Science & Medicine*. Forthcoming.

Yeung, Dannii Y. (2013). "Is pre-retirement planning always good? An exploratory study of retirement adjustment among Hong Kong Chinese retirees." Aging & mental health, Vol. 17, No. 3, pp. 386-393.