

# Subtypes of Transitions into a Family Caregiving Role: A Latent Class Analysis

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## Abstract

This paper groups persons who have transitioned into family caregiving using a latent class analysis and examines class differences on measures of well-being. Latent classes were identified for a sample of 251 participants who became family caregivers while participating in a longitudinal national study, and linear regression analyses compared average well-being change scores across classes. Fit indices supported a four-class solution dispersed along two conceptual dimensions: caregiving intensity and caregiving strain. The largest class (35.5%) was characterized as low intensity, low strain. The smallest class (12.7%) was characterized as high intensity, high strain, and these caregivers had significantly worse well-being change scores compared to the other caregiving classes. Categorizing caregivers by differing levels of care intensity and caregiving strain helps identify caregivers who are at most risk for poor psychosocial outcomes, determines which caregivers might benefit from specific caregiver support programs, and informs investigators on possible refinements to interventions.

## Keywords

caregiving, mental health, family, well-being, stress

### *What this paper adds*

- This paper analyzes a more heterogeneous sample of family caregivers compared to previous latent class analyses and uses indicators solely of the caregiving experience rather than demographics or other external measures.
- This analysis includes data on the health and well-being of persons before they transitioned into a family caregiving role, therefore allowing for an effective comparison of outcomes after caregiving across different subgroups of caregivers.

### *Applications of study findings*

- This paper confirms that most caregivers are not experiencing high levels of strain or negative outcomes; therefore, interventions should be targeted towards specific needs of subgroups of caregivers.
- The analysis framework used in this study—where only measures of the caregiving experience were used to group caregivers into latent classes—can be applied to other samples of caregivers to determine which classes arise and whether the proportion of caregivers in each class are similar to the proportions found in this analysis.

## Introduction

Older adults with disabilities typically rely on family caregivers for regular assistance with daily living needs. Family caregivers are a heterogeneous group that consists of spouses, adult children, other family members, and neighbors or friends of persons with disabilities. Heterogeneity is also present in the experiences of caregivers in terms of the amount and type of care they provide, the challenges they face, and the benefits they experience from caregiving (Wolff et al., 2018). Some caregivers may be at increased risk for psychological distress and physical health problems as a result of caregiving stressors (Pinquart & Sörensen, 2003), but the overall population of caregivers does not appear to

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Data Availability Statement included at the end of the article

experience a deleterious effect on all-cause mortality (Mehri et al., 2021; Roth et al., 2015).

It is increasingly acknowledged that there is no central, generic caregiving role. Building upon the multifactorial conceptual models of Pearlin et al. (1990) and Lawton et al. (1991), Montgomery and Kosloski (2013) articulated a comprehensive caregiver identity theory that explicitly accounts for the substantial diversity among caregivers in terms of the type and quantity of care they provide and the duration of time over which that care is provided. The theory includes discussions of the acquisition or transition into the caregiving role and the gender-based and cultural factors that influence these transitions and the types of care delivered. Identity is also an important component of the shared identity theory advocated by Lang and Fowers (2019), who sought to understand in an evolutionary context why humans are motivated and find meaning in providing care for many years to loved ones with dementia. Evolutionary perspectives on the motivators and benefits of prosocial helping behaviors such as caregiving have also been offered in an attempt to explain positive caregiving experiences (e.g., Brown & Brown, 2015; Roth et al., 2018). Each of these perspectives share certain elements including observations that there is a wide range in how or why persons take on caregiving roles, the types and amount of care provided, and the long-term health implications of the burdens or strains they may experience in those roles. Although these conceptual models provide clarity in understanding the diversity of informal caregiving experiences, additional work is needed to further evaluate and modify these models. These include continued efforts to identify and validate specific caregiving subtypes with empirical data.

One promising method for developing a deeper understanding of caregiving subtypes based on the experiences of persons who have transitioned into family caregiving roles is latent class analysis (LCA) (Sinha et al., 2021; Weller et al., 2020). LCA assumes that a heterogeneous sample can be empirically divided into distinct subgroups based on a set of indicator variables. Findings from LCA studies have been used to tailor future interventions based on subgroup membership (Weller et al., 2020). Therefore, identifying subtypes of caregivers and determining their broad distress levels by subtype through LCA could reveal characteristics of individuals in need of interventions to relieve their stress levels, whereas other groups of caregivers might not need such interventions but could benefit from other resources.

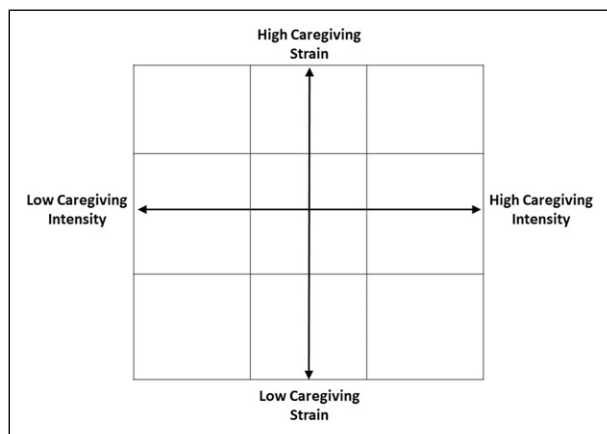
Several studies have sought to identify subgroups of family caregivers using LCA. These studies have varied substantially in terms of indicator and auxiliary variables examined. Multiple studies have used measures of burden and benefit perceptions as indicators for grouping caregivers (Pristavec, 2019; Sung et al., 2021), and other studies have used demographic and caregiving relationship measures as indicator variables either in isolation (Wiegelmann et al., 2021) or alongside measures of the caregiving experience

(Graven et al., 2020; Janssen et al., 2016). Other work has used coping strategies (Yuan et al., 2021), stress and health profiles (Miller et al., 2020), and caregiving for activities of daily living (ADLs) and instrumental activities of daily living (IADLs) (Huang et al., 2020) as indicator variables to identify caregiver subgroups. The list of potential indicators is thus quite extensive, and with varied guidance on what indicators are suitable or most effective.

In addition to the wide range of indicator variables used, other important differences exist across previous LCAs of family caregivers, as well as some converging findings. The number of latent classes found varies considerably, ranging from two (Miller et al., 2020) to six (Wiegelmann et al., 2021). Most solutions include one or two classes of caregivers who report high levels of burden or distress. This latent class has been assigned different labels, such as “dissatisfied” (Pristavec, 2019; Sung et al., 2021), “high strain” (Janssen et al., 2016), or “poorer health” (Miller et al., 2020). Previous studies generally demonstrate that this highly distressed subgroup of caregivers is relatively small, usually between 10% and 35% of caregivers, compared to the larger classes of caregivers experiencing low or moderate levels of burden and stress.

Many previous LCAs of family caregivers have focused on caregivers of specific diseases such as dementia (Janssen et al., 2016; Wiegelmann et al., 2021; Yuan et al., 2021), cancer (Miller et al., 2020) or heart failure (Graven et al., 2020), and limited work has been done using broader samples of caregivers for persons with more heterogeneous medical conditions. To our knowledge, none of the previous LCAs of family caregivers have included data on the health and well-being of persons before they transitioned into a family caregiving role. The question of which variables are used as indicators versus auxiliary variables is also important (Sinha et al., 2021). One potential unifying conceptual advance is to only use measures of the current caregiving experience such as measures of caregiving intensity (e.g., duration of care, number of hours of care per week, and number of problems for which help is provided) and caregiving burden (e.g., caregiving strain and stress appraisals to specific caregiving activities) as indicator variables. Figure 1 illustrates these two fundamental dimensions, with grid lines that represent different combinations of high, medium, and low levels on these dimensions for conceptualizing caregiving subtypes. Measures of positive aspects of caregiving might also be considered as indicators of a lack of caregiving strain, although it is certainly possible for some caregivers to experience both high strain and some benefits (Beach et al., 2000; Lawton et al., 1991). Variables that are not directly assessing aspects of the caregiving experience, such as demographic variables and other more general measures of health and well-being (e.g., quality of life and depressive symptoms) could be predictors or outcomes of the caregiving experience and therefore are best conceptualized as auxiliary variables.

The data used for the LCA presented in this paper come from the Caregiving Transitions Study (CTS), which is a



**Figure 1.** Conceptual framework used to guide latent class indicator selection. Although caregiving strain and intensity are displayed as orthogonal constructs, this is not required either conceptually or analytically. Furthermore, the sizes of the boxes displayed in the figure are not meant to imply anything about the sizes of the possible classes.

national, population-based study of family caregiving (Roth et al., 2020). The CTS enrolled individuals who transitioned into family caregiving roles at some point while participating in another large, national epidemiologic study, the Reasons for Geographic and Racial Differences in Stroke (REGARDS) study (Howard et al., 2005). The pre-caregiving data on quality of life and depressive symptoms available from the REGARDS study provide a unique opportunity to examine potential differences in well-being that may precede transition into family caregiving or that result after the transition to caregiving took place. Caregivers are classified based on indicator variables of their current caregiving experiences (i.e., caregiving strain and intensity), and latent classes are then further compared across external measures from before to after the transition into the family caregiving role.

## Methods

### Data

The data analyzed in this paper were collected from 251 incident caregivers from the CTS (Roth et al., 2020), which is an ancillary study of the REasons for Geographic and Racial Differences in Stroke (REGARDS) study (Howard et al., 2005). The REGARDS study is a national epidemiologic cohort study of stroke incidence that enrolled 30,239 community-dwelling participants 45 or more years of age from 2003 to 2007. Participants consented verbally on the telephone to be a part of the REGARDS study and later provided written informed consent at the beginning of the in-home assessment visits.

As part of the enrollment interview into REGARDS (see below), participants were asked if they were providing

ongoing care to a family member with a chronic illness or disability. Participants were re-assessed approximately 12 years later during a follow-up telephone interview on their caregiving status. If they were caregivers at this follow-up assessment and not caregivers at the REGARDS enrollment interview, they were further asked additional questions about their caregiving experience to determine eligibility for enrollment into the CTS (Roth et al., 2020).

As part of their participation in the REGARDS study, two in-home assessments separated by an average of 9.4 years were conducted. REGARDS participants who transitioned into a family caregiving role between the first and second REGARDS in-home assessments were enrolled in the CTS as incident caregivers. Eligible caregivers who consented to participate in the CTS then participated in a structured telephone interview that collected additional information regarding their mental health, well-being, and caregiving experiences (Roth et al., 2020). More thorough descriptions of the CTS and the REGARDS study are provided elsewhere (Haley et al., 2020; Blinka et al., 2022), including a timeline of data collection sessions (Roth et al., 2020). The REGARDS and CTS were reviewed and approved by the Institutional Review Boards of the University of Alabama at Birmingham and Johns Hopkins University, respectively.

### Measures

*Variables from the REGARDS Enrollment Interview (2003–2007).* At enrollment into REGARDS between 2003 and 2007, a baseline computer-assisted telephone interview (CATI) was performed to collect demographic information such as race, sex, marital status, and date of birth (Roth et al., 2020). This CATI also asked participants if they were providing ongoing care to a family member because of a chronic illness or disability. Individuals who answered “no” were eligible to later become incident caregivers. As a part of the REGARDS enrollment CATI, individuals also completed a 4-item version of the Center for Epidemiological Studies Depression (CES-D) scale (Melchior et al., 1993); the 12-item SF-12 health survey that contained Physical Component Summary (PCS) and Mental Component Summary (MCS) scores, with higher scores indicating better physical and mental health, respectively (Jakobsson, 2007; Ware et al., 1996); a 4-item perceived stress scale (PSS-4) (Cohen et al., 1983); and a measure of their social network size (Lubben et al., 2006).

*Variables from the REGARDS Caregiving Screening (2016–2017).* Between 9.1 and 14.1 years (mean = 11.7 years) after enrollment into REGARDS, participants completed a caregiving screening interview during which caregiving status was re-assessed by asking participants if they were “currently providing care on an ongoing basis to a family member, friend, or neighbor with a chronic illness or disability.” For those who answered “yes,” they were further asked about

their relationship with that person; whether that person has “Alzheimer’s disease, another form of dementia, or other serious memory problems”; the age of the care recipient; and whether the caregiver is the “main or primary family member or friend” who provides help to this person.

*Variables from CTS Enrollment Interview (2016–2018).* REGARDS participants who indicated in the REGARDS enrollment interview that they were not caregivers at that time and later indicated in the caregiving screening interview that they were caregivers were scheduled for a subsequent eligibility screening and CTS enrollment interview. After obtaining informed verbal consent, participants were asked when they first started providing care to the care recipient; whether they lived with the care recipient and, if not, how many miles away from that person they lived; and how many hours of care they provided in a typical week. In order to be eligible for the CTS, caregivers had to report starting care after the REGARDS enrollment interview and first in-home assessment, had to be providing at least 5 hours of care per week, and had to either live with or within 50 miles of a community-dwelling care recipient. Caregivers for care recipients who resided in nursing homes or assisted living facilities were not included in the CTS.

Several variables obtained from the CTS enrollment interview were used in the present analyses. Caregivers were initially asked an overall caregiving strain question, specifically “how much of a mental or emotional strain it is on you to provide this care? Would you say no strain, some strain, or a lot of strain?” Next, caregivers were asked a series of questions to determine the number of problems for which they provided assistance in terms of ADLs, IADLs, cognitive problems, emotional problems, and disruptive behavior problems. For each problem (e.g., needed help with dressing), caregivers were asked if that problem occurred at all over the past week, and if so, caregivers then rated how much the problem bothered or was upsetting to the caregivers when it occurred (1 = Not at all, 5 = Extremely). From these questions, scores were obtained for the number of each type of problem as well as an overall average bother rating that was calculated by dividing the sum of the upset ratings by the total number of problems reported by the caregiver.

Participants then answered interview queries that reassessed measures of their own health and well-being. This included the 10-item CES-D scale (Irwin et al., 1999); the SF-12 health survey containing the PCS and MCS scores; the PSS-4; and the measure of their social network size. To utilize these measures in auxiliary variable analyses, change scores were calculated by subtracting the measure obtained during the REGARDS enrollment interview (conducted between 2003–2007) from the measure obtained during the CTS enrollment interview (conducted between 2016–2018). For the CES-D scores, because the pre-caregiving measure was from a 4-item scale and the post-caregiving measure was from a 10-item scale, a 10-item version of the pre-caregiving measure was estimated using a linear regression model as derived in a previous analysis of CTS data (Haley et al., 2020).

Cronbach’s alpha was calculated for self-report measures extracted from multiple items. Assessments of problems (i.e., ADL and IADL) had alphas ranging from .57 to .82. Average bother rating had an alpha of .91. Measures of well-being (CES-D, PSS, and social network size) had alphas ranging from .50 to .82. Positive aspects of caregiving had an alpha of .82.

## Analyses

Latent class models were estimated using Mplus version 8 (Muthén & Muthén, 2017). To identify subtypes of caregivers enrolled in the CTS, indicators included measures of caregiving intensity (hours of care per week; duration of care in years; number of ADL, IADL, cognitive, emotional, and disruptive behavior problems for which care was provided; and dementia vs. non-dementia caregiving), caregiving strain (overall caregiving strain rating; average bother rating across observed ADL, IADL, cognitive, emotional, and disruptive behavior problems), and a measure of caregiving benefits, the positive aspects of caregiving score (Tarlow et al., 2004). Overall caregiving strain was coded numerically (1 = no strain, 2 = some strain, and 3 = a lot of strain) and all indicators were treated as continuous except for the binary indicator of dementia caregiving status. The absolute value of all pairwise correlations between indicators was less than .60.

Latent class models with different numbers of classes were evaluated. Selection of the most appropriate model was based on a number of characteristics: 1) information criteria, 2) likelihood-based tests, and 3) entropy measures of each model (Nylund-Gibson & Choi, 2018). An elbow plot of the change in BIC as the number of classes increased was also used to inform the number of classes. Model interpretation and parsimony were considered in model selection, as too many classes can result in overfitting (Sinha et al., 2021).

After the optimal class size was selected, the final model was rerun with multiple random starts to ensure robustness of estimates. Relationships between probabilistic latent class membership and auxiliary variables such as demographics, quality of life measures, and distress measures were then assessed. For binary and continuous variables, the automatic BCH (Bolck, Croon, and Hagenaars) method was used, and for non-binary categorical variables, the DCAT method was used (Asparouhov & Muthén, 2021).

Finally, the manual BCH weighting procedure (Asparouhov & Muthén, 2021) was employed to conduct multiple linear regression analyses to evaluate differences on several continuous outcome variables across latent classes. For each separate regression, the outcome variable was a change score (i.e., post-caregiving transition minus pre-caregiving) for one of five measures of quality of life or well-being: CES-D, PCS, MCS, PSS-4, and social network score. Latent class membership was the main predictor variable in each model, with the pre-caregiving score of the given outcome, whether the caregiver was caring for a spouse or not, the age, sex, and race of the caregiver, and the age of

the care recipient included as covariates. All covariates except for latent class membership were centered to aid in the interpretation of the class-specific means on the change score outcomes (Nylund-Gibson & Choi, 2018). Furthermore, relationships between the covariates and the outcomes were constrained to be the same across all classes.

## Results

### Sample Characteristics

Table 1 shows descriptive statistics of the total sample. Of the total 251 caregivers, 64.9% were female, 64.1% were White, 87.3% were primary caregivers, and 51.0% were caring for their spouses. At the time of the CTS enrollment interview, the caregivers had an average age of 69.3 years, while the recipients had an average age of 78.7 years. Hours per week averaged at 43.3 hours, and years of care at 5.8 years.

### Number of Latent Classes of Family Caregivers

Table 2 displays model fit statistics for the one-through six-class models. The six-class model had estimation problems so it and models with more than six classes were not further considered. The five-class model had the best BIC value; the four-class model was preferable according to the VLMR *p*-value and nearly significant according to the LMR *p*-value. The elbow plot of the BIC values (Figure 2) shows evidence in favor of the four-class model. Given this information, along with the fact that the four-class model is more parsimonious and less likely to be hampered by sample-specific overfitting, the four-class model was selected to represent subtypes of family caregivers in the CTS.

### LCA-Defined Subtypes of Family Caregivers

Profiles of the four latent classes on the 11 indicator variables are presented in Table 3, and the differential pattern on these

**Table 1.** Descriptive Statistics for the Sample and Each Latent Class for Auxiliary Variables.

Auxiliary variables	Total sample ( <i>n</i> = 251) N (%)	Latent classes				<i>p</i> - value**
		Low intensity, low strain ( <i>n</i> = 89) %	Moderate intensity, moderate strain ( <i>n</i> = 71) %	High intensity, low strain ( <i>n</i> = 59) %	High intensity, high strain ( <i>n</i> = 32) %	
Female	163 (64.9)	58.9	71.2	64.3	69.0	.51
Black	90 (35.9)	30.0	32.3	50.2	33.4	.12
Caregiver providing care for:						
Spouse	128 (51.0)	53.3	38.8	58.7	58.2	.02
Parent	63 (25.1)	19.8	31.9	21.3	31.4	
Child	8 (3.2)	0.8	6.0	5.1	0.0	
Other	52 (20.7)	26.1	23.2	14.9	10.5	
Primary caregiver	219 (87.3)	87.9	82.7	87.9	94.5	.39
	<b>Mean (SD)</b>	<b>Mean (SE)</b>	<b>Mean (SE)</b>	<b>Mean (SE)</b>	<b>Mean (SE)</b>	
Age of caregiver	69.28 (7.94)	69.21 (.81)	69.48 (1.00)	69.77 (1.23)	68.15 (1.62)	.89
Age of care recipient	78.70 (11.27)	76.49 (1.27)	80.90 (1.49)	78.31 (1.58)	80.67 (1.75)	.11
Pre-Caregiving PSS-4 <sup>a</sup> score	2.90 (2.62)	2.69 (.30)	3.31 (.34)	3.17 (.38)	2.09 (.39)	.11
Pre-Caregiving 10-item CES-D <sup>b</sup> score	3.44 (3.10)	3.09 (.30)	3.85 (.39)	3.41 (.50)	3.55 (.69)	.52
Pre-Caregiving MCS <sup>a</sup> score	54.90 (6.71)	55.88 (.65)	54.39 (.75)	55.23 (1.13)	52.87 (1.60)	.25
Pre-Caregiving PCS <sup>a</sup> score	48.10 (10.31)	49.65 (1.02)	48.36 (1.36)	44.80 (1.70)	49.21 (1.78)	.12
Pre-Caregiving social network score	7.30 (2.03)	7.45 (.25)	7.43 (.23)	7.33 (.28)	6.52 (.35)	.13

Bolded values indicate the best value

\*\**p*-value is for test of overall equality of means across all classes.

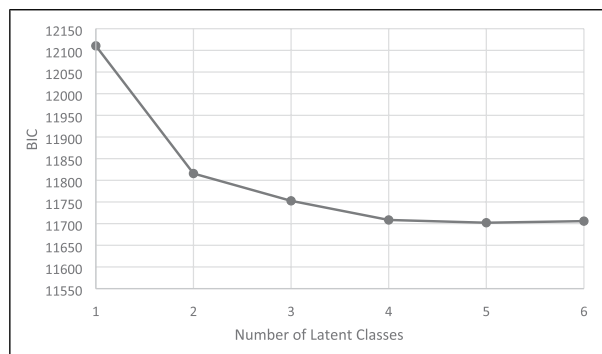
<sup>a</sup>Abbreviations are PSS-4: Perceived Stress Scale; CES-D: Center for Epidemiological Studies Depression; MCS: Mental Component Summary; PCS: Physical Component Summary.

**Table 2.** Model Fit Statistics for 1-Through 6-Class Models.<sup>a</sup>

Classes	LL	AIC	BIC	SABIC	LMR p	VLMR p	BLRT p	Entropy	Class sizes (most likely class)
1	-5997.23	12036.45	12110.49	12043.91					1: 251
2	-5816.69	11699.38	11815.72	11711.10	<.001	<.001	<.001	.802	1: 114 2: 137
3	-5752.00	11593.99	11752.64	11609.98	<b>.003</b>	.003	<.001	.845	1: 109 2: 116 3: 26
4	-5696.77	11507.53	11708.49	11527.79	.050	<b>.047</b>	<.001	.879	1: 89 2: 71 3: 59 4: 32
5	-5660.42	11458.84	<b>11702.10</b>	11483.36	.25	.24	<.001	.882	1: 87 2: 20 3: 58 4: 52 5: 34
6 <sup>b</sup>	<b>-5629.11</b>	<b>11420.22</b>	11705.79	<b>11449.01</b>	.191	.187	<.001	<b>.892</b>	1: 29 2: 22 3: 42 4: 54 5: 69 6: 35

<sup>a</sup>Column abbreviations are spelled out as follows: LL: log-likelihood value; AIC: Akaike Information Criterion; BIC: Bayesian Information Criterion; SABIC: Sample size-adjusted Bayesian Information Criterion; LMR: Lo-Mendel-Rubin p-value; VLMR: Vuong-Lo-Mendel-Rubin p-value; BLRT: Bootstrapped Likelihood Ratio Test p-value

<sup>b</sup>Best log-likelihood value was not replicated.



**Figure 2.** Elbow plot of BIC for 1-through 6-class models.

variables that define each latent class are discussed below. Classes were labeled based on level of caregiving intensity and strain and broken down into low, moderate, or high, relative to the other classes. Furthermore, for each class, descriptive information on demographic variables and on pre-caregiving distress and well-being measures from the REGARDS enrollment interview are displayed in Table 1. Statistics were calculated using probabilistic class membership rather than most likely class membership to account for error in the latent class model.

Of particular note is that the latent classes did not differ significantly on any pre-caregiving measure of psychological

distress or well-being from the REGARDS enrollment interview. That is, pre-existing differences were not evident on screening measures of depressive symptoms, perceived stress, health-related quality of life, or social network size.

**Class 1: Low Intensity, Low Strain Caregivers.** This category of caregivers represents the largest class of caregivers in the CTS sample (35.5%). This class included caregivers that were addressing the lowest average number of each of the types of problems. Caregivers in this class had the lowest average hours per week at 21.2 hours, but not the lowest the average duration of care (5.91 years). This class had the lowest mean caregiving strain rating of the four classes, second lowest average bother rating, and second highest average positive aspects of caregiving score. Only 10.2% of this class were dementia caregivers. On auxiliary variables, recipients of caregivers in this class had the lowest mean age of the four classes.

**Class 2: Moderate Intensity, Moderate Strain Caregivers.** The second class of family caregivers included 71 individuals, making up 28.3% of the sample. This class experienced moderate caregiving intensity, noted by a moderate number of IADL, cognitive, emotional, and disruptive problems. This class still had a low average for weekly hours of care at 25.7 hours, and the average duration of care was 5.58 years. For strain, this class was labeled as moderate strain because it had moderate

**Table 3.** Descriptive Statistics of Class Indicators per Latent Class.

Class indicators	Low intensity, low strain (n = 89)	Moderate intensity, moderate strain (n = 71)	High intensity, low strain (n = 59)	High intensity, high strain (n = 32)
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)
Caregiving strain	1.76 (.08)	2.36 (.09)	1.97 (.09)	2.77 (.10)
Hours of care per week	21.25 (1.72)	25.70 (1.87)	78.15 (1.84)	79.41 (2.27)
Duration of care in years	5.91 (.29)	5.58 (.31)	5.64 (.34)	6.13 (.50)
Positive aspects of caregiving score	47.10 (.93)	41.20 (1.67)	48.44 (1.11)	38.69 (2.83)
Number of ADL problems	1.21 (.20)	2.09 (.32)	3.05 (.34)	5.03 (.47)
Number of IADL problems	4.12 (.20)	5.92 (.14)	5.24 (.22)	6.40 (.14)
Number of cognitive problems	1.60 (.25)	4.72 (.35)	3.40 (.39)	4.83 (.55)
Number of emotional problems	1.79 (.23)	3.22 (.29)	2.18 (.26)	3.46 (.59)
Number of disruptive problems	.70 (.11)	2.44 (.26)	1.08 (.16)	2.71 (.37)
Average bother rating	.78 (.09)	1.58 (.14)	.74 (.08)	1.66 (.17)
	%	%	%	%
Dementia caregiver	10.2	75.1	46.5	84.2

averages for caregiving strain (2.4), the bother rating for care recipient problems (1.6), and for positive aspects of caregiving (41.2). For all of these measures, this class showed strain levels that were not as high on average as that reported by caregivers in class 4. This class included 75.1% caring for individuals with dementia. This group of caregivers included the lowest percentages of primary caregivers and spouse caregivers.

**Class 3: High Intensity, Low Strain Caregivers.** The third caregiving subgroup included 23.5% of the sample and involved caregivers who experienced high caregiving intensity but rather low caregiving strain. Caregivers in this class had a very high average number of weekly hours of care at 78.1 and dealt with moderate to high numbers of problems faced by their recipients. The average duration of caregiving was 5.64 years. Despite this high workload, caregivers in this class had the lowest average bother rating out of the four classes, the second lowest average caregiving strain, and the highest average positive aspects of caregiving score. About 46.5% of this group was caring for individuals with dementia. This class had the highest percentage of Black caregivers at over 50%, and it was the group with the highest proportion caring for a spouse at 58.7%.

**Class 4: High Intensity, High Strain Caregivers.** Finally, the last and smallest class of caregivers included 32 individuals (12.7%) who were characterized as high intensity, high strain caregivers. Caregivers in this subgroup faced the highest number of all types of problems. These caregivers had the

highest average weekly hours at 79.4, with the longest duration at 6.1 years. In terms of strain, these caregivers also had the highest average caregiving strain and average bother rating, and the lowest positive aspects of caregiving score. Finally, 84.2% of this group was caring for individuals with dementia. This was the youngest group of caregivers on average.

### Well-Being and Quality of Life across Classes

Table 4 presents the results of five multiple linear regression models, in which each dependent variable is a quality of life or well-being change score (post-caregiving transition minus pre-caregiving) listed in the table rows, and the predictors are latent class membership and six centered control variables (pre-caregiving score of a given outcome, age of the caregiver, age of the care recipient, race of the caregiver, sex of the caregiver, and whether the caregiver was caring for a spouse). The entries in the table are therefore the means and standard errors of a given change score for each latent class, with the control variables at their average values. For example, holding all controls at their average values, the average change on the 10-item CES-D score was, in increasing order, 1.5 for the low intensity, low strain class; 2.0 for the high intensity, low strain class; 4.5 for the moderate intensity, moderate strain class; and 9.2 for the high intensity, high strain class. This indicates that the CES-D score increased for each class between pre- and post-caregiving transition, but that the increase was most dramatic for the small number of caregivers in the high intensity, high strain class. Note that for the CES-D and PSS-4

change score measures, a *positive* value implies a higher score at post-caregiving transition compared to pre-caregiving, which represents a “worse” outcome. For the PCS, MCS, and social network scores, a *negative* change score indicates a decrease in the score from pre- to post-caregiving transition, and also represents a “worse” outcome.

The last two columns of the table report the Wald Chi-Square statistic and *p*-value for assessing whether adjusted

average scores are the same across classes. The four classes showed significant differences in mean change scores for the CES-D, MCS, and PSS-4. For each of these scores, the largest decrease in well-being score occurred in the high intensity, high strain group, and the smallest decrease in well-being score occurred in the low intensity, low strain group. Finally, standardized Z-score means for each class on the 5 measures of well-being and quality of life are displayed in [Figure 3](#).

**Table 4.** Average Well-Being and Quality of Life Change Scores per Class after Controlling for Demographics.<sup>a</sup>

	Low intensity, low strain (n = 89), mean (SE)	Moderate intensity, moderate strain (n = 71), mean (SE)	High intensity, low strain (n = 59), mean (SE)	High intensity, high strain (n = 32), mean (SE)	Wald Chi-square <sup>b</sup>	<i>p</i> -Value <sup>b</sup>
10-Item CES-D <sup>c</sup> Score <sup>d,e,f,g,h</sup>	1.46 (.54)	4.46 (.80)	1.97 (.73)	9.23 (1.55)	26.67	<.001
PCS <sup>c</sup> Score	-3.89 (1.15)	-3.73 (1.49)	-3.89 (1.29)	-3.47 (2.12)	.03	.998
MCS <sup>c</sup> Score <sup>d,e,f,g,h</sup>	-1.67 (1.02)	-7.61 (1.23)	-2.96 (1.40)	-13.58 (2.29)	27.97	<.001
PSS-4 Score <sup>c,d,e,f,g,h</sup>	.80 (.29)	2.19 (.36)	1.13 (.36)	3.74 (.58)	24.63	<.001
Social Network Score <sup>f,g</sup>	-1.02 (.21)	-.41 (.26)	-1.10 (.28)	-1.43 (.34)	6.83	.077

<sup>a</sup>Each regression controlled for the pre-caregiving value of the respective well-being score, age of the caregiver, age of the care recipient, race of the caregiver, sex of the caregiver, and whether the caregiver was caring for their spouse or not.

<sup>b</sup>Wald Chi-square test and *p*-value is for test of equality across all classes.

<sup>c</sup>Abbreviations are CES-D: Center for Epidemiological Studies Depression; MCS: Mental Component Summary; PCS: Physical Component Summary; PSS-4: Perceived Stress Scale.

<sup>d</sup>Significant difference between low intensity, low strain and moderate intensity, moderate strain.

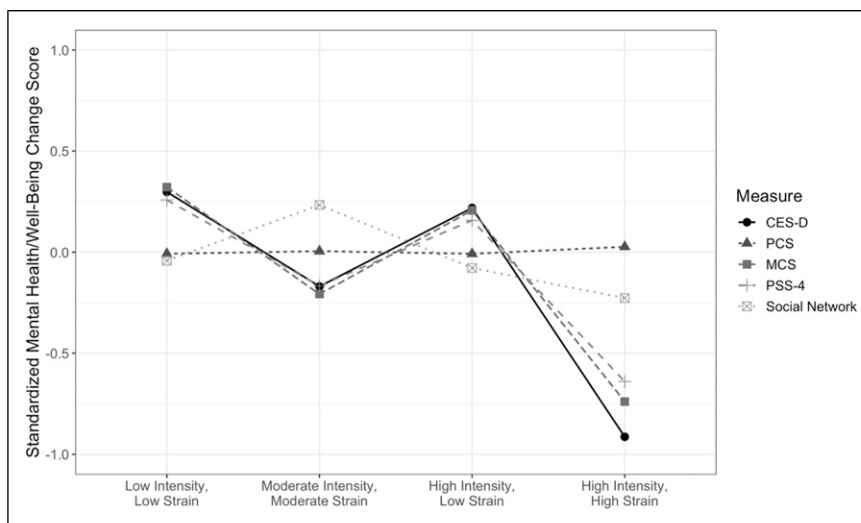
<sup>e</sup>Significant difference between low intensity, low strain and high intensity, high strain classes.

<sup>f</sup>Significant difference between moderate intensity, moderate strain and high intensity, low strain caregiver classes.

<sup>g</sup>Significant difference between moderate intensity, moderate strain and high intensity, high strain caregiver classes.

<sup>h</sup>Significant difference between high intensity, low strain and high intensity, high strain caregiver classes.

<sup>i</sup>Significant difference between low intensity, low strain and high intensity, low strain classes.



**Figure 3.** Standardized well-being and quality of life change scores per class after controlling for demographics. Note: Each regression controlled for the pre-caregiving value of the outcome change score, age of the caregiver, the age of the care recipient, the race of the caregiver, the sex of the caregiver, and whether the caregiver was caring for their spouse or not. Values are taken from the regressions and then standardized by subtracting out overall mean and dividing by overall standard deviation across whole sample per measure. A negative change score indicates a decrease in well-being according to the measure (CES-D and PSS-4 scores were reverse-coded).



## Discussion

This analysis builds on previous studies that have used LCA to empirically identify subtypes of family caregivers. Our analysis is distinct from most previous LCAs of family caregivers in that we only included indicator variables that directly measured aspects of the caregiving experience. In addition, our study is the only LCA study of caregiving that utilized measures of well-being before participants transitioned into a family caregiving role. Changes in the measures of well-being were examined as auxiliary variables.

The largest subgroup in our analysis (35.5% of all caregivers) consisted of caregivers who were low in intensity and in strain. We also identified a fairly large subgroup of caregivers who reported moderate caregiving intensity and moderate caregiving strain (28.3% of all caregivers). We identified two classes that were relatively high on caregiving intensity, but only 35.2% of these high-intensity caregivers were also high on caregiving strain. It is therefore worth highlighting the high intensity, low strain class, as this is a unique group of individuals who provide a very high amount of care but who do not experience high levels of distress alongside this care. Individuals in this class are worth exploring further to determine what skills are present that help them experience this intensive caregiving in a positive way.

All LCA studies that have included indicators of caregiver distress, burden, strain, or health generally agree that only a small minority (10%–35%) of caregivers are classified as experiencing high levels of distress. This class was labeled “high intensity, high strain” in our analysis and consisted of 12.7% of the caregivers in the CTS. The high intensity, high strain subgroup had the worst scores on multiple auxiliary variables, including change scores for depressive symptoms, perceived stress, and health-related quality of life. These findings are consistent with a previous study that found elevated levels of depressive symptoms and poorer health-related quality of life only in the minority of caregivers who also reported high caregiving strain (Roth et al., 2009). An important contribution from the present analysis is that we found no statistically significant differences in depressive symptoms or health-related quality of life across the four latent classes in measures collected before the transition to caregiving. Thus, our findings suggest that high strain caregivers were not predisposed to elevated emotional distress prior to becoming caregivers.

There are limitations to our analysis that should be considered and addressed in future studies. Some caregivers were excluded from the current sample due to exclusion criteria used in the Caregiving Transitions Study (Roth et al., 2020). All caregivers had to be providing care for a minimum several consecutive months, so very short-term caregivers were not included in this sample, and the inclusion criterion of 5 or more hours of care per week also excluded some caregivers

with more minimal caregiving intensities. Additionally, the biracial recruitment of REGARDS provided a large sample of African Americans, but prevented Hispanic, Asian, American Indian, and other minorities from participating, so findings cannot be generalized to these groups. Future work should build upon the indicator framework (Figure 1) developed in this paper and apply it to caregivers in some of these groups that were not addressed in the present study. The LCA approach might also be useful for further examining possible differences by race, ethnicity, or other demographic factors and their associations with caregiving strain and intensity. Findings from such studies could further clarify previous reports of differences in caregiver well-being across racial groups (Liu et al., 2021).

The sample size of 251 caregivers is somewhat of a limitation; more rare subgroups, such as potentially low intensity, high strain caregivers, might have been missed due to the sample size or characteristics of care recipients included. This analysis was also restricted to variables that were collected in the CTS and REGARDS data collection procedures, which included long and comprehensive lists of important measures, but some information was not collected that might have provided additional information on the classes. This includes measures such as motivations or reasons for caregiving, whether caregivers perceived having a choice in taking on the caregiving role, more explicit and complete measures of social support, or other information about life stage (i.e., employment status and having children). These measures could affect both the intensity and the perceived strain of caregiving. The latent class formation also was performed based on a cross-sectional set of variables, which does not account for the fact that some caregiving experiences could be changing over time. Although the four classes did not differ much on our measure of caregiving duration, future research could further examine caregiving experiences longitudinally through an approach like latent transition analysis.

The high intensity, high strain subgroup of caregivers, though relatively small in our sample, is still a notable proportion of our sample, and services, interventions, and supports that are designed to help caregivers manage the stressors of caregiving and improve their emotional well-being are important to further develop and make available for this subgroup. Caregivers in other latent classes could also benefit from many supportive services and programs. Family caregivers are the backbone of the long-term care that older adults with disabilities receive, and many caregivers, including those who report relatively low caregiving intensity and caregiving strain, might benefit from additional information or training for their roles (Burgdorf et al., 2021). Other support services and programs, such as those oriented toward care coordination (Judge et al., 2011), benefit-finding (Cheng et al., 2019), and respite opportunities like those provided by adult day services (Fields et al., 2014), should be further developed

and evaluated, as such programs may be beneficial to caregivers from multiple latent classes in our analysis. Just as caregivers themselves are diverse, we need a more diverse array of interventions, programs, and services to offer to caregivers and a more systematic method to match caregiving needs with appropriately targeted services.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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### IRB Approval

The REGARDS and CTS were reviewed and approved by the Institutional Review Boards of the University of Alabama at Birmingham (IRB No. 020925004) and Johns Hopkins University (IRB No. 00096563), respectively.

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### Data Availability Statement

In cooperation with the Institutional Review Board (IRB) of the University of Alabama at Birmingham, the REGARDS project (Howard et al., 2005) facilitates data sharing through formal data use agreements. Investigators who wish to access the data and code for these analyses should send their requests to [regardsadmin@uab.edu](mailto:regardsadmin@uab.edu).

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