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**The Use of Behaviour and Mood Medications by Care-
recipients in Dementia and Caregiver Depression and
Perceived Overall Health**

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SEDAP Research Paper No. 218

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The Use of Behavior and Mood Medications by Care-recipients in Dementia and Caregiver Depression and Perceived Overall Health

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ABSTRACT

The mental and physical health of dementia caregivers has been shown to be worse than that of non-caregivers. The present study was undertaken to investigate whether the caregivers of persons who take medications for behavior and mood problems in dementia are less depressed, and perceive their overall health to be better, than the caregivers of persons who do not take such medications. Behavior and mood medications include anti-psychotics, anti-depressants, and anti-convulsants. The Canadian Study of Health and Aging was used to identify informal, unpaid caregivers of persons with dementia (i.e., Alzheimer's disease, vascular dementia, or other dementia [e.g., Parkinson's disease]). The caregivers of persons diagnosed with cognitive impairment not dementia or no cognitive impairment were also included in the study. Care-recipient use of behavior and mood medications was not found to affect caregiver depression (OR = 1.02; 95% CI = 0.62 to 1.66) or caregiver's perceived overall health (OR = 1.35; 95% CI = 0.80 to 2.27).

RÉSUMÉ

Il est démontré que les donneurs de soins aux personnes atteintes de démence sont en moins bonne santé physique et mentale que les non-donneurs. Cette étude a été menée afin d'examiner si les donneurs de soins aux personnes qui prennent des médicaments pour traiter des problèmes comportementaux liés à la démence sont moins déprimés et se considèrent en meilleur état de santé général que les donneurs de soins aux personnes qui ne prennent pas de médicaments. Les médicaments traitants les troubles comportementaux comprennent les anti-psychotiques, les anti-dépresseurs, et les anti-convulsifs. L'Étude sur la santé et le vieillissement au Canada a été employée afin d'identifier les donneurs de soins informels et bénévoles aux personnes atteintes de démence (i.e. la maladie d'Alzheimer, la démence vasculaire, ou d'autres formes de démence (comme la maladie de Parkinson)). Les donneurs de soins aux personnes atteintes de déficiences cognitives et non de démence ou aux personnes ne souffrant pas de déficiences cognitives ont aussi été inclus dans l'étude. Le recours aux médicaments pour traiter les problèmes de comportement ou de tempérament n'aurait pas d'incidence sur l'état dépressif des donneurs de soins (OR = 1.02; 95% IC = 0.62 à 1.66) ou la perception de leur état de santé générale (OR = 1.35; 95% IC = 0.80 à 2.27).

INTRODUCTION

Dementia caregivers can develop mental or physical health problems as a result of the multiplicity of tasks, and substantial time commitments involved in, caregiving.^{1,2} Informal, unpaid caregivers have been found to be more likely than non-caregivers to report fair or poor (versus good or very good) health, to use psychotropic drugs, and to require medical care.² On account of these consequences, caregivers have been called the “hidden victims” of dementia.³

There is evidence to indicate that caregivers may benefit when their loved ones take medications for dementia. Medications such as donepezil, rivastigmine, galantamine, and memantine have been shown to reduce caregiver burden or the amount of time required to provide care.^{4,5}

Persons with dementia are often prescribed more than just one type of medication during the course of treatment. Besides the aforementioned four medications, which are used to symptomatically treat cognitive decline, persons with dementia may be prescribed drugs to help manage behavior and mood problems (e.g., delusions, anxiety, irritability).⁶⁻¹¹ These medications include anti-psychotics (e.g., risperidone, olanzapine, carnitine, physostigmine, linopirdine), anti-depressants (e.g., citalopram, sertraline, fluoxetine, fluvoxamine), and anti-convulsants (e.g., divalproex sodium, carbamazepine).

To date, there has been no examination of whether anti-psychotics, anti-depressants, or anti-convulsants can confer benefits to the caregivers of persons with dementia. The caregiver impact of these medications is important to investigate because persons with dementia rely heavily on their caregivers, especially as the disease progresses. Caregivers’ ability to fulfill this demanding role may be hampered by the stresses and strains of caregiving. If these medications

can reduce problematic behaviors and moods, then persons with dementia may be easier to manage. This could lead to reductions in caregiver health problems.

The issue of caregiver benefits from behavior and mood drugs is especially vital because some anti-psychotics, anti-depressants, and anti-convulsants have been linked to adverse effects (e.g., stroke, further cognitive decline)^{9,12-14} that could increase the difficulty of caregiving.

This study was conducted to examine the associations between (1) the use of anti-psychotics, anti-depressants, or anti-convulsants by persons with dementia and (2) caregiver depression and caregiver's perceived overall health.

METHODS

Sample Frame

Data for this study were drawn from the database of the Canadian Study of Health and Aging (CSHA), a population-based study of dementia in Canada.¹⁵ The CSHA consisted of 9,008 community-dwelling persons aged 65 years or over who were randomly sampled from 36 nationwide communities and assessed for dementia.¹⁶ Data were collected in 1991 (CSHA-1), 1996 (CSHA-2), and 2001 (CSHA-3).

The caregivers of a subgroup of the 9,008 persons in the CSHA were interviewed to obtain information on caregiver support networks, care-recipients' ability to perform activities of daily living, care-recipients' behavior disturbances, and caregiver burden and depression. The subgroup was selected according to cognitive status.

The sample for this study was drawn from the 1,135 informal, unpaid caregivers in CSHA-3. These caregivers were friends or relatives of care-recipients and they were self-identified as bearing primary responsibility for the provision of daily care. Formal, paid

caregivers were not included in CSHA-3. The sample was limited to CSHA-3 to control for differences in prescribing practices over time and to account for the fact that the composition of the caregiver cohort was not uniform over the three waves of the CSHA.

Caregivers were entered into this study if they could be linked to a care-recipient in the CSHA-3 database (i.e., the caregiver/care-recipient dyad could be identified). As well, the care-recipient had to have undergone a clinical examination at CSHA-3 (n = 1,386). Medication use was assessed only for persons who underwent the clinical examination. A final inclusion criterion was the type of diagnosis. Care-recipients in the dyad had to have an incidence diagnosis of probable or possible Alzheimer's disease (AD), cognitive impairment not dementia (CIND), vascular dementia, or 'other' dementia (e.g., Parkinson's disease). Care-recipients without any cognitive impairment were also included because they could still be receiving anti-psychotic, anti-depressant, or anti-convulsive medications for other health problems.

Data Analysis

Hypothesis. The caregivers of care-recipients who take anti-psychotic, anti-depressant, or anti-convulsive medications are less likely to be depressed, and more likely to perceive themselves to be in better overall physical health, than the caregivers of care-recipients who do not take these medications.

Main effect (independent) variable. The main effect variable was 'care-recipient's use of a behavior and mood medication.' The variable was dichotomized as follows: 1 = current use of at least one behavior and mood medication, namely risperidone, olanzapine, carnitine, physostigmine, linopirdine, citalopram, sertraline, fluoxetine, fluvoxamine, divalproex sodium,

or carbamazepine; 0 = no current use of at least one behavior and mood medication.

Covariates. To help test the hypothesis, the Caregiver Stress Process Model was used to select covariates from the CSHA dataset.¹⁷ This model describes the interaction between the demands of care-recipients and the balancing of positive and negative caregiver experiences. The model contains three different groups of covariates: background/contextual covariates (e.g., sample characteristics), stressors (e.g., extent of required care), and mediators (e.g., coping resources available to caregivers). Based on these groups, the following covariates were included in the analysis:

1. Background/contextual: caregiver sex and age, caregiver's annual household income in Canadian dollars (< \$30,000; \$30,000 to \$44,999; \$45,000 to \$69,999; ≥ \$70,000), caregiver's living arrangements (caregiver lives with care-recipient -- yes/no), care-recipient's living arrangements (community, medium institution, large institution), region of residence for caregiver/care-recipient dyad (Atlantic Canada, Quebec, Ontario, Prairies, British Columbia).
2. Stressor: *Care-recipient's ability to perform 14 ADLs (CSHA-3)*. This covariate was based on the Activities of Daily Living scale from the Older Americans Resources and Services Project.^{18,19} For each ADL, caregivers chose the response that best described the care-recipient's ability to perform the activity in question. Response options were: without any help, with some help, or completely unable to perform the ADL. For this study, the covariate was dichotomized: 1 = any sort of help required for at least one ADL; 0 = no help required for any ADL.
3. Mediator: *Caregiver's use of formal services in the past year (CSHA-3)*. For this

covariate, caregivers were asked if they used each of nine formal services (e.g., homemaker, in-home nursing) in the past year to help provide care. For this study, the covariate was dichotomized: 1 = use of at least one formal service; 0 = no use of any formal services.

Additional covariates included the incidence diagnosis for care-recipients (no cognitive impairment, CIND, AD, vascular dementia, other specific dementia [e.g., Parkinson's disease]) and the severity of dementia (mild, moderate, severe).

Dependent variables. The dependent variables were selected on the basis of the Caregiver Stress Process Model, which contained caregiver outcomes such as depression and health. The dependent variables in this study were caregiver depression and caregiver's perceived overall health. A) *Caregiver depression.* In CSHA-3, caregiver depression was measured using the short version of the Centre for Epidemiologic Studies Depression (CES-D) scale,^{20,21} which has questions about the frequency of 10 depressive symptoms over the time span of one week. Four response options were available for each symptom, and a score was assigned to each option: occurred for less than 1 day (score = 0), occurred for 1-2 days (score = 1), occurred for 3-4 days (score = 2), occurred for 5-7 days (score = 3). The total score could range from 0 to 30. In the CSHA, caregivers with scores of 10 or more were considered to be depressed. For this study, depression was dichotomized: 1 = depressed (CES-D score \geq 10); 0 = not depressed (CES-D score < 10). B) *Caregiver's perceived overall health.* In CSHA-3, caregiver's perceived overall health was assessed using a question from the Short-Form Health Survey (SF-12): "In general, would you say your health is ...". Five response options were available: excellent, very good, good, fair, or poor. For this study, the variable was dichotomized: 1 = excellent/very good/good; 0 = fair/poor.

Regression. Multiple logistic regression was used to examine the association between the main effect variable and each of the two dependent variables. Regression analyses were conducted separately for each dependent variable.

To avoid losing data on account of missing values, multiple imputation²² was used to replace missing values with plausible values. Five datasets were imputed using a conditional Gaussian model and all regression analyses were performed on each dataset. Each analysis produced one set of parameter estimates per dataset. To obtain a summary result for each analysis, the parameter estimates were combined using algorithms developed by Rubin²² for the multiple imputation process.

To ensure that the use of multiple imputation would not bias the study results, a comparative check was done for each of the study variables. For categorical variables, the frequency distributions of the CSHA data (which had missing values) were compared to the combined frequency distributions of the five imputed datasets using Fisher's exact test. For continuous variables, medians were compared using the Wilcoxon rank-sum test.

The regression analyses were conducted in accordance with the following steps:

1. Simple logistic regression was used to identify covariates that had a marginal effect ($p < 0.25$)²³ on caregiver depression or caregiver's perceived overall health.
2. To assess effect modification, an interaction term was formed for each covariate that had a marginal effect. The interaction term included the covariate in question and the main effect variable. Effect modification was deemed to be present if the p-value for the interaction term was < 0.05 in a model that also contained both the covariate in question and the main effect variable.

3. Confounding was assessed for all covariates that were not effect modifiers, and for all covariates that did not have a marginal effect on the dependent variable in question. A covariate was considered to be a confounder when the odds ratio of the main effect variable changed by $\pm 10\%$ after the covariate had been added to a model containing only the main effect variable and the dependent variable.
4. A full regression model was built for each dependent variable. The full model included the main effect variable and any covariates that (1) had marginal effects on the dependent variable in question or (2) that were found to be confounders. The full model also included any interaction terms that were found to have p-values < 0.05 in point # 2 above.
5. The Hosmer and Lemeshow goodness-of-fit test was used to assess the accuracy of model fit.

SAS v9.1 (The SAS Institute, Cary, NC) was used to obtain frequency distributions and conduct all regression analyses. S-Plus v6.1 (Insightful Corp., Seattle, WA) was used to perform the multiple imputation. The threshold for statistical significance was the 5% level ($p < 0.05$).

RESULTS

A total of 987 caregiver/care-recipient dyads met the inclusion criteria. Broken down by diagnosis, these dyads included AD ($n = 137$ [14%]), vascular dementia ($n = 43$ [4%]), other dementias such as Parkinson's disease ($n = 12$ [1%]), CIND ($n = 462$ [47%]), and no cognitive impairment ($n = 333$ [34%]). The severity of disease in persons with dementia ($n = 192$) was almost evenly split between the mild and moderate categories, with 43% mild ($n = 83$), 49%

moderate (n = 94), and 8% severe (n = 15). Of the caregivers, almost three-quarters were female, a third reported annual household incomes of \$45,000 or more, nearly half were living in the same house as the care-recipient, and just over half reported using one or more formal community services in the past year. Two-thirds of caregivers reported that care-recipients required help with one or more ADLs (Table 1).

Only 6% (n = 57) of care-recipients were using a behaviour and mood drug (Table 1). Fifteen used an anti-psychotic, 32 used an anti-depressant, and 12 used an anti-convulsant. Two of the care-recipients used medications from two classes, while the remaining 55 used a medication from one class only.

Close to 85% of caregivers were found to be free of depression. The median CES-D score was 2 (25 to 75% interquartile range: 0 to 7). Almost 85% of caregivers also perceived their overall health to be excellent, very good, or good, with most reporting very good or good (Table 1).

The comparisons of frequency distributions or medians showed that there were no differences between CSHA data with missing values and the imputed data ($p > 0.05$ for all comparisons). This indicated that multiple imputation could be employed to prevent a loss of data in the regression analyses without introducing a bias due to the use of imputed values.

The crude association between care-recipients' use of behavior and mood medications and caregiver depression was positive. The crude association between care-recipients' use of behavior and mood medications and caregiver's perceived overall health was also positive. However, the results were not statistically significant at the 5% level (Table 2).

The following covariates were found to have marginal effects on both dependent variables: caregiver lives in the same house as the care-recipient, caregiver sex, caregiver/care-

recipient region of residence, caregiver use of formal community services in the past year, care-recipient needs help with ADLs, caregiver's annual household income, and care-recipient sex. Severity of dementia was found to have marginal effects on caregiver depression. None of these covariates were found to be effect modifiers.

The assessment of confounding identified care-recipient's incidence diagnosis and caregiver age as confounders in the models for both dependent variables.

The covariates that had marginal effects on a dependent variable, or that were confounders, were included in the full model for that dependent variable.

In the full model for depression, the presence of two related covariates (i.e., care-recipient's incidence diagnosis, severity of dementia) prevented the logistic model from adequately fitting the data. The problem was resolved by combining the two covariates into a new variable with 11 categories (no cognitive impairment, CIND, and separate mild, moderate, and severe categories for each of the three types of dementia [AD, vascular dementia, other specific dementia]). No cognitive impairment was the reference category.

In the depression model (Table 3), there was no association between the care-recipient's use of a behavior and mood medication and caregiver depression (odds ratio [OR] = 1.02; 95% confidence interval [CI] = 0.62 to 1.66). The only part of any covariate that was statistically significant at the 5% level was Ontario as the region of residence for caregiver/care-recipient dyads (OR = 1.68; 95% CI = 1.12 to 2.53).

In the caregiver's perceived overall health model (Table 4), there was a positive association between the care-recipient's use of a behavior and mood medication and better caregiver health. However, the association was not statistically significant at the 5% level (OR = 1.35; 95% CI = 0.80 to 2.27). Some covariates were statistically significantly associated with

caregiver health, including caregivers living in the same house as the care-recipient (OR = 0.65; 95% CI = 0.52 to 0.81), Ontario (OR = 0.62; 95% CI = 0.45 to 0.87) or Quebec (OR = 1.51; 95% CI = 1.03 to 2.21) as the region of residence for caregiver/care-recipient dyads, and caregiver's use of one or more formal community services in the past year (OR = 0.78; 95% CI = 0.62 to 0.97).

Hosmer and Lemeshow (HL) goodness-of-fit tests were done to check model fit. Five HL tests—one per imputed dataset—were performed for the full model of caregiver depression and five others were performed for the full model of caregiver's perceived overall health. Test statistics (χ^2) ranged from 15.33 to 5.02 and p-values ranged from 0.05 to 0.76, thus indicating good model fit.

DISCUSSION

In this study, behavior and mood medications were not found to have an impact on dementia caregivers' depression or perceived overall health.

This is the first study of caregiver outcomes from the use of medications to treat behavior and mood in dementia. Consequently, no direct comparisons can be made with other published research. However, indirect comparisons can be made with research into another set of medications (i.e., cholinesterase inhibitors [ChEIs]) that are used to treat dementia. There is only equivocal evidence for caregiver benefits from care-recipients' use of ChEIs. Lingler et al.⁴ reviewed caregiver burden and time in 17 dementia drug trials and conducted a meta-analysis of four trials on caregiver burden and six trials on time devoted to caregiving. Effect sizes in the meta-analysis were measured using Cohen's d ,²⁴ where values between 0.20 and 0.50 indicate that active medications, relative to placebo, have small to medium beneficial effects on

outcomes. Lingler et al. calculated tiny effect sizes, namely 0.18 (95% CI = 0.04 to 0.32) for burden and 0.15 (95% CI = 0.07 to 0.24) for time. When the trials composing the meta-analysis were considered separately, the results in one of the four burden trials and four of the six time trials were not statistically significant at the 5% level.

One of the trials in the Lingler et al.⁴ meta-analysis—the AD2000 trial²⁵ of 5 mg and 10 mg doses of the ChEI donepezil—contained a caregiver outcome that was similar to an outcome in this study (i.e., depression). The AD2000 researchers measured the psychological well-being of caregivers using the 30-question General Health Questionnaire (GHQ-30),²⁶ which has a score range of 0-30. Lower scores indicate better psychological well-being. Over the course of follow-up, persons treated with donepezil had lower average scores than persons treated with placebo. Average scores were 0.3 points lower (95% CI = -0.3 to 0.9) than placebo in the 5 mg donepezil group and 8.0 points lower (95% CI = -2.3 to 0.7) in the 10 mg donepezil group. However, as was the case in this study, the differences were not statistically significant at the 5% level.

In this study, several covariates were found to be associated with caregiver depression and caregiver's perceived overall health. One interesting covariate was the region of residence for the caregiver/care-recipient dyad. Caregivers in dyads residing in Ontario were more likely to be depressed and less likely to perceive better overall health than caregivers in dyads residing in Atlantic Canada (the reference category). This is intriguing given that Ontario is Canada's richest province and there are numerous health and social support services in place to assist caregivers and care-recipients. Perhaps certain intangible community characteristics, which were not measured in the CSHA, can help account for this finding. For example, Atlantic Canada is composed of many small, rural or semi-rural communities where grassroots-level familial or

communal support might provide some sort of a psychological boost to counteract the ill effects of caregiving. Caregivers may feel less depressed because they are part of a tight-knit community that they believe will provide support in the event of hardship. Similarly, the availability of such support could ease some of the difficulty of caring and lead to better-perceived health. In Ontario, the more urbanized nature of society could mean that community or family structures do not convey as strong a sense of support as in Atlantic Canada.

In contrast to Ontario, caregivers in dyads residing in the Province of Quebec, which is also more urbanized than Atlantic Canada, were more likely to perceive their health as good or better than caregivers in Atlantic Canada. Perhaps certain socio-cultural differences between predominantly French-speaking Quebec and English-speaking Atlantic Canada could account for this difference. Further research into the social and cultural determinants of caregiver depression and perceived overall health is warranted given the importance of caregivers in the management of dementia patients.

Two other covariates were associated with caregiver's perceived overall health. First, caregivers who used one or more formal community services in the past year were less likely to perceive their health to be good or better than caregivers who did not use any formal community services. Second, caregivers who lived in the same house as the care-recipient were less likely to perceive their health to be good or better than caregivers who did not live in the same house.

This study has some limitations. First, all of the data were collected at the same point in time (i.e., at CSHA-3). Cross sectional data lack temporality, which means a dependent variable can precede a main effect variable or a covariate (reverse causality bias²⁷). Second, only a small number of care-recipients were using behavior and mood medications. This could have underpowered the study with respect to detecting a main effect. Third, missing values,

especially the large number of missing values for caregiver's annual household income and caregiver age, necessitated the use of multiple imputation to prevent a loss of data for the regression analyses. While there can be no perfect substitute for complete data, the use of multiple imputation allowed all of the subjects to be retained in the analyses. If no imputation procedure was used, then caregivers with a missing value on only one variable would have been deleted from all regression analyses. Indeed, multiple imputation is preferred over other forms of imputation (e.g., mean, hot deck, regression)²⁸ and a comparison of frequency distributions and medians showed that there were no differences between the CSHA data (with missing values) and the imputed data. Fourth, data on some potentially important covariates were not available (e.g., intangible familial or community support). This could have led to residual confounding. Fifth, several potential caregiver outcomes (e.g., caregiver burden measured using the Zarit Burden Interview²⁹) were only assessed at CSHA-1 and CSHA-2, but not at CSHA-3. This limited the scope of outcomes that were available for study.

In conclusion, no statistically significant associations were found between care-recipients' use of behavior and mood medications and caregiver depression or caregiver's perceived overall health. Given the importance of caregivers in dementia, and the negative impact that behavior and mood problems can have on the ability to provide care, future research should focus on an expanded set of caregiver outcomes. This research should also be longitudinal in nature.

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Table 1. Sample Characteristics (n=987)

<i>Characteristic</i>	<i>Frequency</i>	
	<i>No.</i>	<i>%^a</i>
Caregiver sex		
Male	256	26
Female	731	74
Caregiver's annual household income		
< \$30,000	255	26
\$30,000 - \$44,999	209	21
\$45,000 - \$69,999	160	16
> \$70,000	162	16
Missing	201	20
Caregiver lives in same house as care-recipient		
Yes	427	43
No	560	57
Caregiver use of formal community services in the past year		
No use	419	42
Used \geq 1	567	57
Missing	1	< 1

Table 1. Continued

<i>Characteristic</i>	<i>Frequency</i>	
	<i>No.</i>	<i>%^a</i>
Care-recipient needs help with ADLs		
No help required	307	31
Help required with ≥ 1 ADLs	680	69
Care-recipient uses a behavior and mood medication		
Yes	57	6
No	930	94
Caregiver's perceived overall health		
Excellent	197	20
Very good	328	33
Good	301	31
Fair	126	13
Poor	27	3
Missing	8	< 1
Caregiver depressed		
Yes	149	15
No	830	84
Missing	8	1

Table 1. Continued

<i>Characteristic</i>	<i>Frequency</i>	
	<i>No.</i>	<i>%^a</i>
Incidence diagnosis: Care-recipient		
No cognitive impairment	333	34
Cognitive impairment not demented	462	47
Alzheimer's disease	137	14
Vascular dementia	43	4
Other specific dementia	12	1
Severity of dementia: Care-recipient		
Mild	83	8
Moderate	94	10
Severe	15	81
Care-recipients' living arrangements		
Community	978	99
Medium institution	5	0.5
Large institution	3	0.3
Missing	1	0.1

Table 1. Continued

<i>Characteristic</i>	<i>Frequency</i>	
	<i>No.</i>	<i>%^a</i>
Region of Residence: Caregiver/care-recipient dyad		
Atlantic	183	19
Quebec	226	23
Ontario	212	21
Prairies	182	18
British Columbia	184	19
Care-recipient sex		
Male	408	41
Female	579	59
Caregiver age (years)	66 (56—83) ^b ; missing = 937 (95) ^c	
Care-recipient age (years)	84 (80—89) ^b ; missing = 0 (0) ^c	

a. Percentages may not add to 100% because of rounding error.

b. Median (25—75% interquartile range).

c. Number (%) of missing values.

ADL = activity of daily living.

Table 2. Crude Associations Between Care-Recipient’s Use of A Behavior and Mood Medication and Caregiver Depression and Caregiver’s Perceived Overall Health (n = 987)

<i>Main Effect Variable</i>	<i>Dependent Variable</i>	
	<i>Caregiver Depression^a</i>	<i>Caregiver’s Perceived Overall Health^b</i>
	<i>OR (95% CI)</i>	<i>OR (95% CI)</i>
Care-recipient’s use of a behavior and mood medication		
Yes	1.25 (0.89—1.74)	1.16 (0.77—1.74)
No	1.00	1.00

a. Yes/no (no = reference category).

b. Excellent—vary good—good/fair—poor (fair—poor = reference category).

OR = odds ratio; CI = confidence interval.

Table 3. Final Model for Care-Recipient’s Use of A Behavior and Mood Medication and Caregiver Depression (n = 987)

<i>Variable</i>	<i>OR (95% CI)</i>
Care-recipient uses a behavior and mood medication	
Yes	1.02 (0.62—1.66)
No	1.00
Caregiver lives in same house as care-recipient	
Yes	1.15 (0.90—1.45)
No	1.00
Region of residence: Caregiver/care-recipient dyad	
British Columbia	0.97 (0.59—1.59)
Prairies	1.20 (0.75—1.93)
Ontario	1.68 (1.12—2.53)
Quebec	0.83 (0.54—1.28)
Atlantic	1.00
Caregiver sex	
Male	0.67 (0.35—1.28)
Female	1.00
Patient sex	
Male	0.84 (0.47—1.50)
Female	1.00

Table 3. Continued

<i>Variable</i>	<i>OR (95% CI)</i>
Caregiver use of formal community services in the past year	
Used \geq 1	1.23 (0.92—1.63)
No use	1.00
Care-recipient needs help with ADLs	
Help required with \geq 1 ADLs	1.40 (1.01—1.95)
No help required	1.00
Annual household income	
> \$70,000	0.64 (0.28—1.45)
\$45,000 - \$69,999	0.98 (0.57—1.69)
\$30,000 - \$44,999	1.22 (0.81—1.84)
< \$30,000	1.00
Incidence diagnosis and severity: Care-recipient	
Other specific dementia – severe	4.20 (0.19—91.07)
Other specific dementia – moderate	0.58 (0.07—4.98)
Other specific dementia – mild	2.03 (0.16—25.99)
Vascular dementia – severe	2.65 (0.32—22.17)
Vascular dementia – moderate	0.53 (0.13—2.09)
Vascular dementia – mild	1.21 (0.34—4.30)
Alzheimer’s disease – severe	1.06 (0.15—7.25)
Alzheimer’s disease – moderate	0.92 (0.41—2.07)

Table 3. Continued

<i>Variable</i>	<i>OR (95% CI)</i>
<hr/>	
Incidence diagnosis and severity: Care-recipient, continued	
Alzheimer's disease – mild	0.51 (0.21—1.28)
Cognitive impairment not demented	0.57 (0.18—1.79)
No cognitive impairment	1.00
Caregiver age	1.05 (0.94—1.18)

OR = odds ratio; CI = confidence interval; ADLs = activities of daily living.

Table 4. Final Model for Care-Recipient’s Use of A Behavior and Mood Medication and Caregiver’s Perceived Overall Health (n = 987)

<i>Variable</i>	<i>OR (95% CI)</i>
Care-recipient uses a behavior and mood medication	
Yes	1.35 (0.80—2.27)
No	1.00
Caregiver lives in same house as care-recipient	
Yes	0.65 (0.52—0.81)
No	1.00
Region of residence: Caregiver/care-recipient dyad	
British Columbia	0.95 (0.65—1.40)
Prairies	0.90 (0.61—1.33)
Ontario	0.62 (0.45—0.87)
Quebec	1.51 (1.03—2.21)
Atlantic	1.00
Caregiver sex	
Male	1.21 (0.79—1.85)
Female	1.00
Patient sex	
Male	1.09 (0.74—1.62)
Female	1.00

Table 4. Continued

<i>Variable</i>	<i>OR (95% CI)</i>
Caregiver use of formal community services in the past year	
Used \geq 1	0.78 (0.62—0.97)
No use	1.00
Care-recipient needs help with ADLs	
Help required with \geq 1 ADLs	0.84 (0.65—1.08)
No help required	1.00
Annual household income	
> \$70,000	1.41 (0.80—2.50)
\$45,000 - \$69,999	1.11 (0.69—1.76)
\$30,000 - \$44,999	1.01 (0.69—1.48)
< \$30,000	1.00
Incidence diagnosis: Care-recipient	
Other specific dementia	1.16 (0.31—4.41)
Vascular dementia	1.05 (0.47—2.31)
Alzheimer's disease	1.14 (0.62—2.08)
Cognitive impairment not demented	0.84 (0.49—1.43)
No cognitive impairment	1.00
Caregiver age	0.99 (0.92—1.07)

OR = odds ratio; CI = confidence interval; ADLs = activities of daily living.

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