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Home care nursing for persons with dementia from a family caregivers' point of view: Predictors of utilisation in a rural setting in Austria

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Abstract

The service utilisation of persons with dementia (PwD) and their caregivers is subject to lively debate. The reasons for non-utilisation are manifold and heterogeneous. Conceptual models and explanatory frameworks may help identify predictors of the usage of health services. Literature examining the utilisation of home care services for PwD is scarce. This study explored predictors of home care nursing utilisation of PwD and their informal caregivers in a rural setting, according to the Andersen Behavioural Model of Health Care Use. A mixed-methods study was conducted in a rural area of Austria. In using non-random multistage sampling, anonymous questionnaires were distributed to collect data on family caregivers of PwD. Data were analysed using sequential binary logistic regression to characterise home care service users. To reflect the complexity of the Andersen model, a regression tree model was used. In total, 107 family caregivers completed the survey. Predisposing factors for home care nursing utilisation were higher age of the caregiver, female gender of PwD and kinship of the PwD and caregiver. Disruptive behaviour and independence in activities of daily living of PwD were associated with need factors for service use. According to the Andersen model, the predisposing and need factors contributed most to the explanation of home care nursing utilisation. The enabling factors employment, education and income tend to predict service use. Our findings indicate that higher age of the family caregiver and female gender of PwD are the main predictors for utilisation of home care nursing in a rural setting. To improve utilisation, the advantages of professional care services should be promoted, and the awareness about the variety of services available should be increased. To ensure a better understanding of the barriers to accessing home care, PwD should more often be included in healthcare service research.

What is known about this topic

- Home care nursing services have been shown to support family caregivers, maintain the independence of PwD, reduce social isolation and prevent early nursing home placement.
- Prior research indicates a greater reluctance concerning the usage of formal care services of PwD and their caregivers in rural areas as compared with urban settings.
- There is a lack of studies examining the utilisation of home care nursing services of PwD.

What this paper adds

- Predictors of home care nursing utilisation for a population of PwD and their caregiver in a rural area in Austria.
- Disruptive behaviour of PwD is probably more stigmatised in rural areas and a relevant reason for non-utilisation of formal home care services.
- Our results provide no evidence for the underutilisation of home care services in a rural area.

1 | INTRODUCTION

In 2016, it was estimated that 46.8 million people lived with dementia worldwide. By 2050, this number is projected to rise to 131.5 million as populations age (Prince et al., 2016). This growth is reflected in Austria, where the overall number of persons with dementia (PwD) will almost double from 146,801 in 2018 to 290,499 in 2050 (Alzheimer Europe, 2019). The majority of PwD receives care from a family member in community settings (Prince et al., 2013). As dementia progresses, PwD become increasingly dependent on others for help with activities of daily living (ADL). Community care services, such as home care nursing, family counselling, respite care, day-care or nursing homes, are often required to either replace or supplement the care provided by family members and to support their efforts (Toseland et al., 2002). Against this backdrop, formal care support is a key issue in preventing early nursing home placement of PwD (Bökberg et al., 2018). Well-known predictors of institutionalisation are caregiver burden, behavioural disorders in the course of dementia or increasing dependency in ADL (Afram et al., 2014). Adequate support involves both reducing caregiver burden and improving the quality of life of informal caregivers and family members with dementia (Granbo et al., 2019). In the community setting, home care nursing is one of the most important services for supporting PwD (Bieber et al., 2019; Prince et al., 2013; van Weel et al., 2019). Home care nursing that provides help with ADL, such as bathing, dressing and mobility, is based on care-related individuals needs and aims to improve the quality of life and maintain the independence of patients so that they can live at home as long as possible (Genet et al., 2011; Thome et al., 2003).

Approximately 80% of Austrian PwD are cared for at home by informal caregivers, mostly family members (Alzheimer Europe, 2019; Toseland et al., 2002). Supporting PwD to continue their life in the community is one of the main objectives of the Austrian dementia strategy (Austrian Dementia Strategy, 2019). Additionally, a seven-level care allowance scale has been established to provide financial support for families who assist or care for relatives at home. The Austrian care allowance does not distinguish between rural or urban areas.

According to their important role, many efforts are undertaken to support family caregivers professionally, to prevent or relieve caregiver burden. Although informal care for PwD is more stressful than caring for people without cognitive impairments (Bertrand et al., 2006), caregivers of PwD often hesitate to seek support from professional healthcare services. This can be attributed to various reasons, such as the perceived lack of need or the reluctance of PwD to accept help from services (Brodaty et al., 2005). Moreover, formal care utilisation is especially low in rural and remote settings with low population density where many services are less available as compared with urban areas (Phillipson et al., 2014). Several studies indicated a greater reluctance concerning the formal care services of PwD and their caregivers in rural areas as compared with urban settings due to access difficulties, lack of availability or concerns about social stigmatisation (Orpin et al., 2014). Therefore, it is important to explore factors that determine the non-utilisation of healthcare services in rural settings.

Low service utilisation increases the risk of institutionalisation for PwD due to caregiver burden (Vandepitte et al., 2018). Additionally, individual attitudes and experiences of PwD and caregivers concerning healthcare services seem to affect service utilisation. Family caregivers who encourage PwD to accept healthcare services should aim for the involvement of PwD in the decision process (Bieber et al., 2019). Lack of inclusion of PwD may result in rejection of service utilisation, as formal healthcare services may be perceived as a threat (Brodaty et al., 2005; Takai et al., 2013).

Concerns of caregivers regarding home care nursing use particularly focus on disturbed privacy and a predetermined day routine through the schedule of home care nurses (Stephan et al., 2018). Moreover, caregivers of PwD report unpredictable services and frequently changing staff members as other concerns (Granbo et al., 2019).

The utilisation of formal community care for dementia is only partly explained by individual aspects. Therefore, a theoretical framework would help describe this complex subject (Bieber et al., 2019). One of the most widely acknowledged theoretical frameworks is Andersen's model of the utilisation of healthcare services, which helps organise factors that affect the usage of health services into predisposing, enabling and need variables (Andersen, 1995). As caregivers play an active role in identifying and accessing services in dementia care, caregivers' predisposing, enabling and need variables are included in modelling the service use of PwD (Martindale-Adams et al., 2015).

Although individual predictors of utilisation are relevant for the further development of community services such as home care nursing, scientific research is scarce in this area (Graessel et al., 2011). Therefore, the present study aimed to (a) investigate the characteristics that predict the utilisation of home care nursing services by PwD and their informal caregivers in a rural area and (b) explore the contribution of predisposing, enabling and need variables to home care nursing service use by PwD and their caregivers in a rural area.

2 | METHODS

This study utilised data from the PAiS project (*Pflegende Angehörige von Menschen mit Demenz in Salzburg*—Family caregivers of persons with dementia in Salzburg). A detailed description of the mixed-methods design, recruiting process and results of the entire study have been published elsewhere (Krutter et al., 2019).

2.1 | Design and data collection

In this cross-sectional study, a postal survey of family caregivers of PwD in rural areas of Salzburg, Austria, was conducted between November 2016 and May 2017. Pretests of the questionnaires were performed within regions in Austria that were comparable with the rural area of Salzburg. The survey was a part of a larger study that included additional surveys with home care nurses and general practitioners (GPs), as well as semi-structured interviews with family caregivers of PwD.

Inclusion criteria for family caregivers were caring for a PwD in the home setting in a rural area of Salzburg County. In following the urbanisation typology of the European Commission (Dijkstra & Poelman, 2014), the rural area of Salzburg County was defined as an intermediate or thinly populated area. The city of Salzburg, a densely populated area, was excluded from our study.

The sampling strategy combined a set of non-random procedures to maximise the sampling frame of the hard-to-reach group of family caregivers of PwD. As our main recruiting strategy, home care nurses and GPs were asked to identify family caregivers of PwD and provide them with an information letter about the study. Additionally, to reach especially those family caregivers in a community setting without contact with home care nurses or GPs, advertisements about the study were placed in mass media, regional newspapers and local trains. Furthermore, information material and flyers were distributed in pharmacies, meals on wheels, acute geriatric facilities, day care centres and support groups for family caregivers. All information material referenced contact details with the invitation to participate in the survey. Upon request, family caregivers received a self-administered paper-based questionnaire (PAPI) with free return envelopes. Submission of the questionnaire was considered as consent.

All survey procedures were approved from the local ethics board of Salzburg County.

2.2 | Instruments

The survey included 43 items about care arrangements (including scales on care needs, caregiver burden and quality of life), knowledge and use of healthcare services, and demographics of the informal caregiver and PwD.

The question 'Are you supported by a home care nursing service in caring for this person (yes/no)?' was employed to represent the main variable of interest for this study, that is, utilisation, defined as the usage of health services. Based on the Andersen model, predisposing, enabling and need characteristics of family caregivers and PwD were independent variables in this study (Andersen, 1995). Additionally, a systematic review of previous studies with the model was referred to for the grouping of the variables (Babitsch et al., 2012).

The predisposing factors included the region of residence, gender, age and family structure of PwD and caregivers. Self-perceived region of residence was classified as rather rural = 0 and rather urban = 1. Family structure was assessed by categorising the possible relationships between the caregiver and PwD into the following three categories (spouse = 1, daughter/son = 2 or others = 0).

Enabling characteristics included employment and education of the caregiver and monthly net household income. Employment was captured as retired, full-time, part-time, housewife/househusband, in education and unemployed and categorised into full-time, part-time and other for analysis. Education was categorised as compulsory school, vocational training, technical or commercial school, high school, and technical college/university. Six categories assessed monthly net household income (up to €1,000, €1,001–1,500, €1,501–2,000, €2,001–2,500, €2,501–4,000 and €4,001 or higher).

The need factors were caregiver burden, disruptive behaviour, amount of daily care time, and functional ADL independence of PwD. The short version of the Burden Scale for Family Caregivers (BSFC-s)

was used to assess caregiver burden, and it was implemented as suggested by Graessel et al. (2014) and Pendergrass et al. (2018). Only the dimension on disruptive behaviour (Cronbach's Alpha = 0.628) from the Nurses' Observation Scale for Geriatric Patients (NOSGER) was included, as bivariate correlations service utilisation with NOSGER subscales supported only the relevance of disruptive behaviour. The measure is a sum score of five items that assess the frequency of occurrence of disruptive behaviour (Spiegel et al., 1991). The amount of care time was measured in hours per day. PwD's independence in ADL was assessed using the Barthel Index (Sinoff & Ore, 1997) (see Figure 1).

2.3 | Data analysis

Four sequential binary logistic regression models were computed to identify the main predictors of home care nursing service utilisation. The predisposing, enabling and need factors were included in the first, second and third models, respectively. The fourth model established a robustness check by controlling the effect of caregiver burden to avoid endogeneity problems.

Although a higher burden could explain service utilisation, the latter could lower caregiver burden. Consequently, the fourth model was a robustness check of the results, while the third model was the basis for the conclusions drawn (see Table 3). The sequential design allowed the identification of possible associations between the different factors of the Andersen model. Nagelkerke's R^2 was used as the determination coefficient for the logistic regression (Nagelkerke, 1991).

To consolidate the findings and differentiate the sample into groups of home care nursing service utilisation and non-utilisation, we used a regression tree model (RTM) (see Figure 2). Due to sample size limitations, we simplified the variables considered in the RTM. Namely, we dichotomised education and skipped employment status to focus on the caregivers' age, gender of PwD and the need factors. The use of multivariate statistical analysis emphasises the underlying associations between the predisposing, enabling and need variables. All calculations were conducted in R, including the rpart package for RTM.
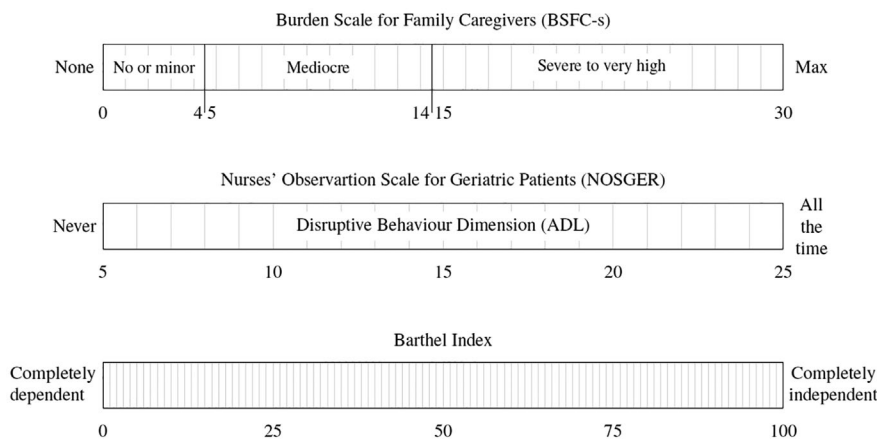

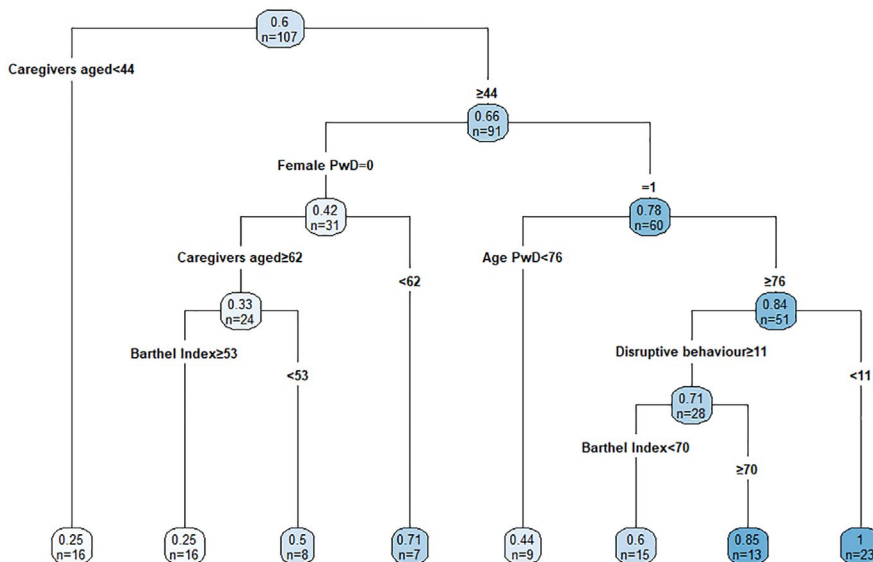FIGURE 1 Instruments for measurement. ADL, activities of daily living

FIGURE 2 Regression tree model (RTM) on use of home care nursing services (N = 107). PwD, persons with dementia. The balloons represent the chance for service utilisation and population meeting the criteria of the tree elements

3 | RESULTS

The sample comprised 113 caregivers, 107 of whom provided information on service utilisation and were included in the final analysis. By employing pairwise deletion across the different models, the initial number of 98 valid cases in the first model dropped to 60 in Model 4. Despite the number of missing cases, the models indicated the robustness of the significant effects. All models showed similar results on applying the following missing imputation strategies: mean imputation (Huisman, 2000) and split samples (Fafchamps & Labonne, 2017). Another robustness check involved dividing the sample into two groups with either less or more than 4-hr daily care time. This analysis also yielded similar results for both groups.

Table 1 shows the main characteristics of family caregivers and PwD, and Table 2 describes the caregivers' awareness of existing community health services in the region.

Most family caregivers (86%) were aware of existing home care nursing services, and more than half (59.8%) used such services. The significant predictors of home care nursing service use were the age of the family caregiver, disruptive behaviour of the PwD and nature of the relationship between the caregiver and PwD (see Table 3, Model 3). Older family caregivers were more likely to use home care services than were younger ones. Spouses had a significantly lower chance of service utilisation than did children caring for a PwD. Compared with the nonworking group, part-time and full-time employed family caregivers showed a higher service utilisation. The income groups between €1,000 and €2,000 had a higher chance to use services than caregivers with lower income and caregivers with a household income above €2,000. Based on the coefficients, there is a tendency that a higher education is associated with a higher service usage compared with lower education groups. Disruptive behaviour of PwD lowered the chance for home care service utilisation.

Female PwD had five times higher chances of receiving home care nursing than did male PwD. Moreover, the chance of service utilisation was five times smaller in areas perceived as 'rather urban' than in areas perceived as 'rather rural'. The interpretation of these effects requires caution due to the tendentious relationship; nonetheless, it seems plausible to assume a difference in service utilisation based on PwD gender and living area.

By comparing the different predictors suggested in the Andersen model, present findings revealed that the predisposing and need factors contributed the most to home care service utilisation. The enabling factors of employment and income indicate a positive correlation to use home care service. The sequential model indicated that the predisposing characteristics provide already half of the explained variance (pseudo-R^2 = 22%). Considering the enabling factors improved the model and emphasised the relevance of PwD gender. When adding the need factors to the model, the gender of the PwD and the relationship between PwD and caregiver became more important. Introducing the caregiver burden (BSFC-s) improved the model only marginal. As mentioned before, we attributed this to the interdependence between caregiver burden and

TABLE 1 Sociodemographic characteristics of family caregivers and PwD

	Family caregivers (n = 113)	PwD (n = 115)
Gender		
Male	27 (23.9%)	36 (32.4%)
Female	86 (76.1%)	75 (67.6%)
Age		
Mean (SD)	60.7 (14.9)	83 (8.2)
Marital status		
Married/cohabitation	84 (74.3%)	50 (44.2%)
Separated/divorced	19 (16.8%)	5 (4.4%)
Widowed	3 (2.7%)	54 (47.8%)
Single	7 (6.2%)	4 (3.5%)
Population at place of residence		
Less than 2,000	7 (6.5%)	9 (8.3%)
2,001–5,000	43 (40.2%)	41 (38%)
5,001–10,000	17 (15.9%)	21 (19.4%)
10,001–15,000	18 (16.8%)	20 (16.7%)
15,001–20,000	10 (6.5%)	9 (5.6%)
20,001 or more	17 (14%)	15 (12%)
Region of residence		
Perceived as rather urban	22 (19.5%)	
Perceived as rather rural	90 (79.6%)	
Perceived as urban and rural	1 (0.9%)	
Barthel Index (BI)		
Mean (SD)		66.56 (25.29)
NOSGER		
Dimension memory mean (SD)		16.59 (3.69)
Dimension disturbing behaviour Mean (SD)		10.16 ± 3.19
BSFC		
Mean (SD)	13.59 (7.56)	
EUROHIS-QOL		
Mean (SD)	3,71 (0.63)	
Employment status		
Retired	56 (50%)	
Full time employed	23 (20.7%)	
Part time employed	24 (21.4%)	
Housewife/househusband	16 (14.3%)	
In education	1 (0.9%)	
Unemployed	3 (2.7%)	
Monthly net household income (€)		
Less than 1,000	29 (30.5%)	
1,001–1,500	24 (25.3%)	
1,501–2,000	23 (24.2%)	

(Continues)

TABLE 1 (Continued)

	Family caregivers (*n* = 113)	PwD (*n* = 115)
2,001–2,500	13 (13.7%)	
2,501–4,000	6 (6.3%)	
Relationship with the care recipient		
Spouse or partner	36 (31.9%)	
Mother/father	52 (46%)	
Brother/sister	2 (1.8%)	
Daughter/son	7 (6.2%)	
Daughter/son in law	2 (1.8%)	
Grandfather/grandmother	7 (6.2%)	
Friend	7 (6.2%)	
Proximity to patient		
Lives in same house	70 (60.9%)	
Caregiving duration (years)		
Mean (*SD*)	4.6 (4.0)	
Caregiving h/day		
Mean (*SD*)	7.5 (7.9)	
Caregiving days/week		
Mean (*SD*)	5.7 (2.0)	
Home nursing service	64 (59.8%)	

Abbreviations: BSFC, Burden Scale for Family Caregivers; NOSGER, Nurses' Observation Scale for Geriatric Patients; PwD, persons with dementia.

TABLE 2 Caregivers' awareness of existing relevant community health services in the region (*N* = 113)

Service	Share of caregivers (%)
General practitioner	98.2
Nursing home	89.9
Home care nursing	86
Day care	68.3
Respite care	70.1
Dementia counselling	40.2
Neurologist/Psychiatrist	72.2

healthcare service utilisation, and therefore, we withdrew Model 4 from further interpretation.

The RTM mainly confirmed the findings from the binary logistic regression, while presenting the results from a different angle. Specifically, it was observed that younger family caregivers had the lowest chance of home care nursing utilisation (0.25, if age <44 years). Among 85% of the caregivers aged ≥44 years, 66% used home care services. Among male PwD with family caregivers aged ≥44 years, the share dropped to 0.42, whereas for female PwD, the share rose to 0.78 (see Figure 2).

Younger caregivers (aged <62 years) caring for a male PwD had a 71% chance of service utilisation, while only one-third of older caregivers (aged ≥62 years) used such services. Fifty per cent of male PwD with a caregiver aged ≥62 years, with a Barthel Index below 53, utilised home care services, whereas only 25% of the same group with higher independence (Barthel Index ≥53) utilised home care services.

The situation for the branches of female PwD was quite different. Younger PwD (aged <76 years) had a lower chance (44%) of utilising home care services than were older PwD (aged ≥76 years, 84%). All older female PwD without disruptive behaviour used home care services. Disruptive behaviour significantly reduced the chance of service utilisation by 71%. We found an opposite effect of the Barthel Index in this branch as higher dependence in ADL lowered the chance of service utilisation to 60%.

In considering the results of the logistic regression and RTM, the age of the family caregiver, gender of the PwD and kinship relationship between the primary caregiver and PwD seem to be the most relevant predictors of service utilisation of home care nursing. The early focus on older family caregivers reducing the likelihood of still living with the spouse masks the negative effect of being a spouse on the chance of service utilisation in the RTM. Hence, we consider this effect in line with the findings of the RTM. The opposite effects in the groups of male and female PwD could account for the non-significance of the Barthel Index in the binary logistic regression models.

In line with the binary logistic regression, the RTM showed that mainly predisposing and need variables were predictors of home care service use by PwD and their caregivers. The enabling variables did not affect the results of the RTM.

4 | DISCUSSION

To our knowledge, this was the first study to investigate the characteristics that predict the utilisation of home care nursing services by PwD and their informal caregivers in a rural area. The results showed that the knowledge about the availability of home care nursing services was relatively high (awareness level 86%), which is consistent with the findings of Graessel et al. (2011), who reported an awareness of 83.8% in a German study. Another important finding was that 59.8% of the responding family caregivers in the present study used home care nursing. This is rather high as compared with the 46.7% observed by Graessel et al. (2011) and the Austrian average of 35% reported for all family caregivers in a community setting (Nagl-Cupal et al., 2018).

4.1 | Behavioural model of service use

To investigate the predictors of home care nursing service utilisation in our cohort, we used the three factors described in the Andersen model Andersen (1995). Our findings revealed that predisposing factors (higher age of the caregiver, female gender of PWD and

TABLE 3 Results of binary logistic regression models (1–4) on home care nursing service utilisation (N = 107)

	Dependent variable			
	Utilisation of home nursing service			
	Predisposing factors	**Enabling factors**	**Need factors**	**Caregiver burden**
	(1)	(2)	(3)	(4)
Female gender of caregivers	0.887 (0.706)	0.962 (0.934)	0.143 (1.695)	0.211 (1.688)
Older age of caregiver	1.144*** (0.041)	1.178*** (0.055)	1.597*** (0.161)	1.540*** (0.160)
Region of residence perceived as urban	0.638 (0.571)	0.290 (0.781)	0.121* (1.193)	0.163 (1.194)
Spouse is the caregiver (ref. others)	0.057** (1.345)	0.265 (1.567)	0.0001** (4.352)	0.001* (4.081)
Daughter/son is the caregiver	0.740 (0.697)	1.115 (0.832)	0.027* (2.206)	0.089 (2.082)
Older age of PwD	0.996 (0.041)	1.009 (0.052)	0.832 (0.114)	0.849 (0.110)
Female gender of PwD	2.297 (0.685)	5.472** (0.858)	21.097* (1.615)	37.574* (1.999)
Full time employment	8.768** (1.045)	11.706* (1.373)	44.681 (2.442)	57.017 (2.558)
Part time employment	1.315 (0.849)	3.382 (1.105)	37.259* (2.098)	31.757 (2.321)
Apprenticeship		3.513 (1.072)	13.902 (2.239)	13.852 (2.623)
Technical school		10.514** (1.196)	26.939 (2.413)	20.789 (2.656)
Final secondary-school examinations (Matura/Abitur)		6.068 (1.227)	35.553 (2.730)	39.254 (3.003)
Technical college/university		1.426 (1.270)	1.027 (2.766)	0.693 (3.402)
€1,001–1,500 (ref. below €1,000)		2.798 (0.953)	15.645* (1.663)	8.117 (1.651)
€1,501–2,000		6.967* (1.103)	33.050* (1.955)	24.360 (2.104)
€2,001–2,500		4.347 (1.037)	2.669 (1.380)	0.852 (1.667)
€2,501–4,000		0.151 (1.746)	0.288 (2.506)	0.195 (2.901)
Disruptive behaviour (NOSGER)			0.611** (0.208)	0.659* (0.214)
Independence in ADL (Barthel Index)			0.967 (0.025)	0.970 (0.028)
Daily care time in h			1.106 (0.071)	1.089 (0.074)
Caregiver burden (BSFC-s)				0.945 (0.070)
Constant	0.001* (3.858)	0.00000** (5.973)	0.004 (8.535)	0.001 (8.918)
McFadden pseudo-R^2	0.220	0.282	0.437	0.454
Observations	98	82	62	60
Log likelihood	−51.364	−39.672	−23.526	−22.063
Akaike information criterion	122.727	115.345	89.052	88.126

Note: The inclusion of caregiver burden validated the findings of Model 3.

Abbreviations: BSFC-s, short version of the Burden Scale for Family Caregivers; NOSGER, Nurses' Observation Scale for Geriatric Patients; PwD, persons with dementia.

*Correlation indicates a trend at the 0.1 level (two tailed).; **Correlation is significant at the 0.05 level (two tailed).; ***Correlation is significant at the 0.01 level (two tailed).

kinship relationship between PwD and caregiver) and need factors (disruptive behaviour and functional independence in ADL) contributed the most to home care service utilisation. However, the enabling factors of employment and income indicate a positive effect on service utilisation in the current study, while education shows a tendency. In contrast, previous studies using the Anderson model reported the severity of behavioural problems and the need for ADL-related support as principal need variables related to the use of community healthcare (Bieber et al., 2019; Gill et al., 1998; Graessel et al., 2011). Other authors suggested that predisposing and enabling factors explained more variance in service use than did need variables (Robinson et al., 2005; Toseland et al., 2002). Furthermore, they argued that the factors may vary depending on the type of service (Toseland et al., 2002). Another study acknowledged the strong need for a statistical analysis that reflects the complexity of the Andersen model (Babitsch et al., 2012). Our RTM to analyse the underlying associations between predisposing, enabling and need variables confirms this insight.

4.2 | Sociodemographic characteristics as predisposing and enabling factors

Our study indicated that an advanced age of the family caregiver and the female gender of PwD are the principal predictors of utilisation of home care nursing services. So far, our results are consistent with those of other studies (Moholt et al., 2018). The association of service utilisation with higher caregiver age is a well-known aspect. Unsurprisingly, elderly family caregivers need more support due to their reduced physical capacity. However, some studies have also demonstrated a reverse effect, with younger caregivers exhibiting more frequent use of home services (Graessel et al., 2011). One explanation may be that younger people are more likely to work, and thus, they have less time but a higher income (Karrer et al., 2020). Therefore, they need and can afford healthcare services. Enabling resources in our study such as employment and income supports the association with service utilisation. This is even more interesting because most study participants in our study came from low-income households. The Austrian care allowance is a seven-level financial system, which usually covers only a small share of care costs. A higher education level, as an enabling resource, was a significant predictor of healthcare service utilisation in German male caregivers (Ludecke et al., 2012). A higher education level and employment were also reported as predictors for home care use (Moholt et al., 2018). It is assumed that persons with a higher education level are better informed about available services and are therefore more persistent in pursuing their rights for social support (Saevareid et al., 2012). The findings on education, employment and income in the current study support this relationship.

When considering kinship between PwD and caregiver, spousal caregivers used home care services less often in our study as compared with other caregivers. Other studies confirmed the finding (Robinson et al., 2013), thus suggesting that feelings of love or sense of obligation may explain the higher commitment of spouses to care for their partner. The cohabitation of spouses and care recipients may explain why spouses as caregivers need respite care more often than do other caregivers (Peeters et al., 2010). In the present study, we investigated the relationship between gender, dementia and service utilisation from different viewpoints. Female PwD had a higher chance of receiving home care than did male PwD. Even when considering cultural differences, male caregivers are usually not so familiar with caregiving or housekeeping tasks. Therefore, female caregivers may be less likely to use in-home services as compared with male caregivers. This may be attributed to traditional gender roles, as women tend to feel more obligated to take over care tasks than do men (Ludecke et al., 2012). On the other hand, research on male caregivers and service utilisation in general is scarce, as demonstrated in a systematic review (Greenwood & Smith, 2015). Additionally, its findings indicated that male PwD used formal community health services less often than did female PwD. This could be due to the higher life expectancy of women, which increases the likelihood of male PwD being left with their spouses.

4.3 | Region of residence as a predisposing factor

Underutilisation of formal services has been reported earlier, particularly in rural areas (Ervin & Reid, 2015). It is unclear whether this is mainly attributable to the inadequate provision of formal services, restricted accessibility, or concerns related to social stigmatisation (Orpin et al., 2014). Other reasons might be the lack of availability of other or more specialised services and longer travel distances due to remote housing. The participants of our study showed a high utilisation of home care services despite their rural residence. This might be a result of one of our sampling strategies, because we requested home care nurses to identify family caregivers of PwD and to inform them about the survey. Informal caregivers like family and friends usually play a more important role in rural areas (O'Connell et al., 2013). One study reported that home care services were used more often by PwD living in urban areas as compared with those living in a rural environment (Moholt et al., 2018). As this study was conducted in Norway, this finding may have resulted from a lack of availability of services in geographically remote areas. Other studies revealed that PwD and their family caregivers underutilised formal services despite sufficient availability (Lethin et al., 2016). In an Australian study exploring health insurance data of dementia patients, only 24.6%–32.2% were found to use home healthcare services (Brodaty et al., 2005). The reasons for this underutilisation might be manifold. One common reason is the lack of knowledge about the availability of support services because caregivers who are aware of available services are much more likely to use them (Phillipson et al., 2014). Another reason is the mismatch between healthcare facilities and the needs of PwD (Bieber et al., 2019; Bökberg et al., 2015). Promoting the advantages of professional care services for the care setting and increasing awareness about the variety of services available may help improve service utilisation.

4.4 | Disruptive behaviour and functional independence as need factors

Behavioural problems can be perceived as a barrier for service utilisation (Phillipson et al., 2014) or, on the contrary, they may lead to the higher utilisation of formal care (Bakker et al., 2013; Robinson et al., 2013). The results of previous studies on formal care use are inconsistent. Some authors have explained the impact of disrupted behaviour on service utilisation as a consequence of the perceived burden of caregivers. Caregivers who felt more disturbed tended to exhibit a higher percentage of non-use of home services (Phillipson et al., 2014). Interestingly, our results showed that, with increasing disruptive behaviour, the use of in-home services decreased significantly. In the subgroup of PwD with highly disruptive behaviour, those with high independence in ADL (Barthel Index >70) tended to receive home care. This can be attributed to the fact that independently mobile PwD usually need much more surveillance compared with PwD with high dependency in ADL. This phenomenon has also

been reported by other authors (Roelands et al., 2008) and for caregivers in rural areas (Ervin & Reid, 2015). In line with everyday experience, people with advanced dementia may show aggressive behaviour towards caregivers, especially towards strangers, and many formal caregivers cannot cope with this challenging behaviour (Neville et al., 2015). Furthermore, especially people living in rural areas might be afraid of social stigma when using services.

4.5 | Strengths and limitations

Our results require cautious interpretation as the data are likely biased representations of the rural area of Salzburg or rural areas in general, as nearly 20% of our participants self-perceived their region of residence as rather urban. We consider our data as a convenience sample without valid cross-reference. Further, the possibility of bias towards higher service utilisation cannot be discounted due to the use of self-reported data and our sampling strategy. Therefore, our causal claims rest solely on theoretical considerations, and the results possess low external validity.

Despite these limitations, the present study has its notable strengths in being the first of its kind in Austria and contributing to the under-researched subject of service utilisation. Furthermore, the use of RTM modelling and the sequential logistic regression model accounted for some complexity of the Andersen model and offered a deeper understanding of the association between the predictors of healthcare service use. The application of two different regression models and multiple robustness checks on the results establish confidence in the findings.

4.6 | Implications

The reasons for service utilisation and non-utilisation by caregivers of PwD seem to be controversial across existing evidence. Advanced age of the family caregiver and female gender of PwD were the principal predictors of home care nursing utilisation in the present study. Additionally, our findings emphasise that spousal caregiving may be a barrier to healthcare service utilisation by PwD. Additionally, our results provide no evidence for the underutilisation of home services in a rural area.

Due to the recruitment of a substantial number of the participants through home care nursing services, this study is unlikely to represent the general caregiver population. Although service utilisation was rather high in our cohort, the results suggest that family caregivers in rural areas need tailored support, particularly for elderly caregivers, male PwD and PwD with low dependency and high disruptive behaviour. Caring for PwD is a process without a clear timeline, but it often develops into a long-term commitment for caregivers. Therefore, caregivers in rural areas need support beyond traditional care tasks, especially in taking leave from the time-consuming care of PwD. Rural caregivers may have

special needs regarding the management of disruptive behaviour of PwD, as this behaviour is probably more stigmatised in rural areas. Promoting the advantages of professional care services for the care setting and increasing awareness about the variety of services available may help improve service utilisation. To ensure a better understanding of the barriers to service utilisation, PwD should also be included in healthcare service research. Future research, using advanced sampling methodology, is required to further identify the needs of rural caregivers who do not use formal healthcare services.

The Andersen model proved useful as a theoretical framework for gaining deeper insights into home care service utilisation in dementia care in the community setting. The present study supports the importance of predisposing and need factors for service utilisation. Further studies need to be conducted to validate whether gender and age are the principal predictors of healthcare service utilisation. Understanding the causes of service utilisation may allow home care nurses to meet the needs and preferences of family caregivers and PwD in rural areas. Disruptive behaviour of PwD may be more stigmatised in rural areas and therefore could represent a greater barrier in home care services utilisation. This should be addressed in counselling caregivers and in promoting services in rural settings.

CONFLICT OF INTEREST
The authors declare that they have no competing interests.

AUTHOR CONTRIBUTIONS
All authors contributed to the research, design and writing of the manuscript. D. S. S. drafted the manuscript with S. K. and A. S., while R. E. M., J. O. and M. F. commented on the drafts of the manuscript. A. S. analysed the data. All authors have read and approved the final version of the manuscript.

ETHICS STATEMENT
Ethics approval and consent to participate: ethics approval was obtained from the local ethics board of Salzburg County (ID: 415-E/2055/4-2016).

The study is registered: German Clinical Trials Register (ID: DRKS00014749).

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request.

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