Sense of Competence in Informal Caregivers of People with Dementia: Effects on Depression and Anxiety

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Abstract

Most dementia patients are cared for at home for several years by a partner or adult child without professional training in caregiving. The current study explored whether the sense of competence in informal caregivers of a person with dementia was predictive of depression and anxiety they experience. Participants included 183 informal caregivers of a person with dementia who completed the Short Sense of Competence Questionnaire (SSCQ, Vernooij-Dassen et al., 1999) and the Hospital Anxiety and Depression Scale (HADS, Spinhoven et al., 1997). They provided care for at least 8 hours per week and were relatives, spouses, or friends of a person with dementia who lived at home. The participants were split into three groups of low, moderate, and high Sense of Competence, based on their SSCQ results. A one-way MANOVA revealed a significant main effect of the caregivers' Sense of Competence on Anxiety and Depression ($p < .001$). Caregivers with a higher Sense of Competence experienced lower levels of Anxiety ($p < .001$) and Depression ($p < .001$). In comparison, a lower Sense of Competence was linked to higher levels of Anxiety and Depression. Exploratory analysis revealed a connection between higher caregiver age, less education, partner relationship status, and cohabitation with the care receiver to a lower sense of competence. Overall, the results underline the importance of detecting and enhancing low informal caregiver competence to alleviate anxiety and depression and improve caregiver well-being.

Keywords: anxiety, competence, depression, informal caregiver

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The number of people diagnosed with dementia worldwide is growing fast (Alary et al., 2017). About 35.6 million individuals were diagnosed with dementia in 2010. Estimations suggest this number will double every 20 years (Wimo et al., 2013). Aging is the number one risk factor for developing dementia, and since we live to a higher age on average, dealing with dementia is an imperative and inevitable problem in our modern society (Alary et al., 2017; Roser et al., 2013). There is an urgent need to know how and why dementia develops in some but not all humans (i.e., Bondi et al., 2017) to prevent this degenerative process as long and effectively as possible but also to research the health of everybody involved to ensure the best quality of life (Alary et al., 2017).

The majority of people living with dementia are being cared for by a relative or a friend at home (Gauthier et al., 2022; Prince et al., 2015; Schulz & Martire, 2004). A meta-analysis showed that most of these so-called informal caregivers are spouses (60%), followed by adult children (39%) (Pinquart & Sörensen, 2006). Informal caregivers provide care to someone with dementia. They are typically unpaid and have a personal relationship with the care receiver (National Research Council, 2010). On the other hand, professional caregivers have received special education in caring for people with dementia or other diseases and are paid (Seidel & Thyrian, 2019). Informal caregivers experience less social care and personal support compared to professional caregivers, resulting in higher psychological strain and lower quality of life (Takahashi et al., 2005). Caregiver burden (CB) is a widely used term to measure the adverse effects of caregiving on the caregiver. CB is the multifaceted strain experienced over time by the informal caregiver (Liu et al., 2020). It combines perceived physical, psychological, social, and financial difficulties (George & Gwyther, 1986). Various care receiver and caregiver characteristics are associated with CB: Behavioral problems, including neuropsychiatric symptoms of the care receiver as well as caregiver competence, coping skills, and personality traits are the most consistent determinants of CB (van den Kieboom et al., 2020; van der Lee et al., 2014). Surprisingly, severity of dementia does not predict CB (Branger et al., 2018), but it is instead associated with problematic behaviors of people with dementia, often resulting in safety issues and high functional dependency (Allen et al., 2019; Branger et al., 2018; Chiao et al., 2015; Liu et al., 2017; Ornstein & Gaugler, 2012).

Dementias are chronic and progressive illnesses with unpredictable medical courses. The average time from diagnosis until death is four to eight years (Brookmeyer et al., 2002). Taking care of an older person with dementia takes more time than providing care for a person with other ailments (Kasper et al., 2015), and the time spent taking care of the person with dementia increases from the first diagnosis until eight years post-diagnosis from an estimated 151 hours per month to 283 hours per month (Jutkowitz et al., 2020). These numbers show that, on average, an unpaid informal caregiver provides care for 35-63 hours a week (McDaid, 2001; Wimo et al., 2013). It is essential to determine the impact of these informal care arrangements on caregivers' well-being and explore measures to mitigate the potential decline in their health and psychological well-being (Chiao et al., 2015). This understanding will help minimize individual and societal costs associated with caregiving. Research indicates that we should help people with dementia as well as their caregivers to benefit everyone involved (Karlsson et al., 2015), which means that in addition to research on prevention, identification, and reduction of dementia risk (Shah et al., 2016), more research on the caregivers as well as the interactive and highly connected relationship between care receiver and caregiver is necessary. Understanding the effects of caregiving on informal caregivers could be an opportunity to modify dementia care early on during the progressive illness of dementia (Pot & Petrea, 2013).

CB is an important predictor of depression and anxiety in informal caregivers (Liu et al., 2017). 32% of informal caregivers of people with dementia reported clinically significant levels of depression (Covinsky et al., 2003), and 25% of caregivers have anxiety, which is higher than in non-caregivers (Mausbach et al., 2013). Depression in caregivers is most likely influenced by multiple interactive risk factors and not by one main problem (Covinsky et al., 2003). Several risk factors are associated with the care receiver: Disruptive behaviors, especially if aggression, rejection of care, and agitation appear in combination, affect caregiver depression negatively (Choi et al., 2019). Declining instrumental Activities of daily living (ADL) and higher severity of delusions but not decreasing cognitive function predict caregiver depression (Hasegawa et al., 2014). Specific care receiver characteristics are also associated with a higher risk for caregiver depression: younger age, male gender, White/Hispanic, less education, ADL dependence, incontinence, and a lower Mini-Mental-Status-Examination score (Covinsky et al., 2003). On the other hand, certain caregiver characteristics are also associated with a higher risk for caregiver depression: higher age, female gender, low income, spousal relationship to and living with the person with dementia, less education, more caregiving hours, and less physical function (Covinsky et al., 2003; Jütten, 2019). Depression is associated with cognitive deficits (Pan et al., 2019) and a decline in psychosocial and physical health (Cassano & Fava, 2002). Depressive symptoms in caregivers of people with dementia predict an increased decrease in health compared to caregivers with no depressive symptomatology (O’Rourke et al., 2007).

Despite anxiety in older people and especially caregivers being common (Kaddour & Kishita, 2020), late-life anxiety in general (Chong et al., 2020), as well as in caregivers of people with dementia (Cooper et al., 2007), has not been a focus of research so far. Anxiety has adverse long-term effects on health and is associated with increased disability, poorer quality of life, and cognitive impairment (Kaddour & Kishita, 2020). Higher anxiety is also associated with higher

CB and lower physical health in caregivers (Cooper et al., 2007). Despite these prominent effects, it is often underestimated in older adults (Bower et al., 2015). Mahoney et al. (2005) identified predictors of anxiety in caregivers of people with dementia, including poorer relationship quality with the care receiver, cohabiting with the care receiver, and ADL impairment.

Another predictor of caregiver depression and anxiety is caregiver competence or perceived sense of competence. The definition of competence is different across research fields and disciplines (Jung et al., 2022). The sense of competence in caregivers is the subjectively perceived adequacy and performance as a caregiver, and all positive and negative caregiving factors influence this (Chan et al., 2018). These factors include caregiver and care receiver demographics, self-efficacy and coping strategies of the caregiver, problematic behavior and severity of dementia in the care receiver, relationship status, as well as finding meaning and experiencing gratitude (Stansfeld et al., 2019). Lower caregiver competence is associated with being female and having a spousal relationship with the care receiver (Stansfeld et al., 2019). Caregiver competence is a consistent predictor of CB, depression, and mental health, with higher competence being beneficial in reducing the burden and depression of caregivers and also improving mental health (Gilhooly et al., 2016). Lower caregiving competence, on the other hand, predicts caregiver depression (Stansfeld et al., 2019; Ying et al., 2018). The strength of this correlation varies over studies. A small but significant negative correlation was found between competence and depression, indicating that higher depressive symptoms in caregivers are associated with a lower sense of competence (Lau & Cheng, 2017). In line with the previous research results, a better understanding of dementia and the related needs of people with dementia is associated with less depression and burden in caregivers (Lau & Cheng, 2017). In addition, caregivers with high understanding are less bothered by problematic behavior (Hepburn et al., 2001), which is strongly associated with caregiver depression (Choi et al., 2019; Covinsky et al., 2003). This higher general knowledge about dementia also positively affects the caregiver's feelings and coping ability, resulting in less psychological stress and fewer negative feelings (Birkenhäger-Gillesse et al., 2018). A possible explanation for this correlation is that higher competence improves the ability to manage behavioral symptoms of dementia better (Jung et al., 2022), which in turn should reduce CB, depression, and anxiety (Covinsky et al., 2003; Ying et al., 2018). The association between competence and anxiety in caregivers is less clear. Anxiety is associated with CB and lower health in caregivers, but the evidence on competence is sporadic and inconsistent (Cooper et al., 2007). Proctor et al. (2002) showed that too little knowledge, limited to biomedical facts about dementia rather than including expertise about caring for and coping with a person with dementia, was associated with greater anxiety. On the other hand, feeling useful, appreciated, and satisfied with caregiving as part of the perceived sense of competence in caregivers is associated with less anxiety (Roff et al., 2004).

Looking into the connection of the caregiver's sense of competence to the severity of depression and anxiety is an essential aspect of understanding CB and, in the long run, developing interventions to improve the well-being of everyone involved in dementia care. The broad picture of current research on caregiver competence, depression, and anxiety is that higher caregiver competence is related to better management of behavioral problems and symptoms of dementia (Jung et al., 2022), reduces caregiver depression (Covinsky et al., 2003; Ying et al., 2018), and possibly also anxiety (Mahoney et al., 2005). Can this association be replicated, and is a higher sense of competence in informal caregivers associated with lower depression? And can this additionally be shown for anxiety? This study focuses on the association of competence, depression, and anxiety in a large group of informal caregivers. For this purpose, this present study assessed competence with a questionnaire specifically designed to measure perceived competence in informal caregivers of a person with dementia measuring satisfaction with caregiving and the consequences of caregiving for the personal life of the caregiver rather than knowledge about dementia (SSCQ, Vernooij-Dassen et al., 1999; Vernooij-Dassen et al., 1996). The goal is to gain insight into perceived competence as a possible modifiable predictor for depression and anxiety. If this is the case, future interventions should focus on improving low perceived competence to avoid adverse long-term effects on caregivers' well-being.

Research Question

Does a higher sense of competence predict lower levels of depression and anxiety in informal caregivers of people with dementia?

Hypotheses

A higher sense of competence is predictive of a lower level of anxiety and depression in caregivers of people with dementia.

A lower sense of competence is predictive of a higher level of anxiety and depression in caregivers of people with dementia.

Demographic caregiver characteristics, such as age, relationship with the care receiver, hours of care per week, and gender, may influence the sense of competence, anxiety, and depression in caregivers of people with dementia.

Methods

Participants

Participants were informal caregivers of a person with dementia. They were relatives, spouses, or friends of the care receiver. This study used the dataset of a more extensive longitudinal quasi-experimental study focused on pre-post measurements and evaluating the effectiveness of the "Into D'mentia" simulator training (Jütten et al., 2017). The focus of this present study was comparing baseline levels of variables. The baseline data of both groups was investigated before any intervention was conducted. The recruitment of participants for the intervention group started in July 2014, with 192 participants screened for eligibility. Among them, 47 were excluded due to not meeting the inclusion criteria (see Figure 1). The intervention group comprised 145 caregivers. For the control group, recruitment started in May 2015 and concluded in January 2017 (Jütten et al., 2017). The screening was performed on 75 participants and resulted in the exclusion of 6 for not meeting the inclusion criteria. Additionally, 13 participants declined to participate after receiving study information. Consequently, the control group consisted of 56 participants. Over both conditions, a total number of 201 participants (N = 201) was included in the baseline measurement relevant to this study. Recruitment, inclusion, and exclusion criteria were the same for both groups. There was no randomization of participants since the groups were recruited consecutively. The inclusion criteria of this study entailed that the caregiver had to be a spouse, relative, or friend of the care receiver, with a minimum of 8 hours of caregiving per week. The care receiver was not institutionalized, and the caregiver had to be at least 18 years old with no upper limit. Exclusion criteria defined that caregivers with physical disabilities preventing them from entering the simulator, communication disabilities (e.g., deafness), or insufficient understanding of the Dutch language that ruled out sufficient understanding of the simulator, were not allowed to participate. Additionally, caregivers with self-reported psychological or medical disabilities that made the simulator too confusing (e.g., self-reported dementia) were excluded.

Ethical Concerns and Approval

This paper is based on a study that adhered to the Declaration of Helsinki guidelines for clinical studies. The protocol was approved by the local ethics committees of the Tilburg School of Social and Behavioral Sciences, Tilburg University, and De Wever in Tilburg, the Netherlands, on December 1, 2015 (Jütten et al., 2017). The study was registered by The Dutch Trial Register (NTR) number: NTR5856. The start of the study (July 2014) and the registry date

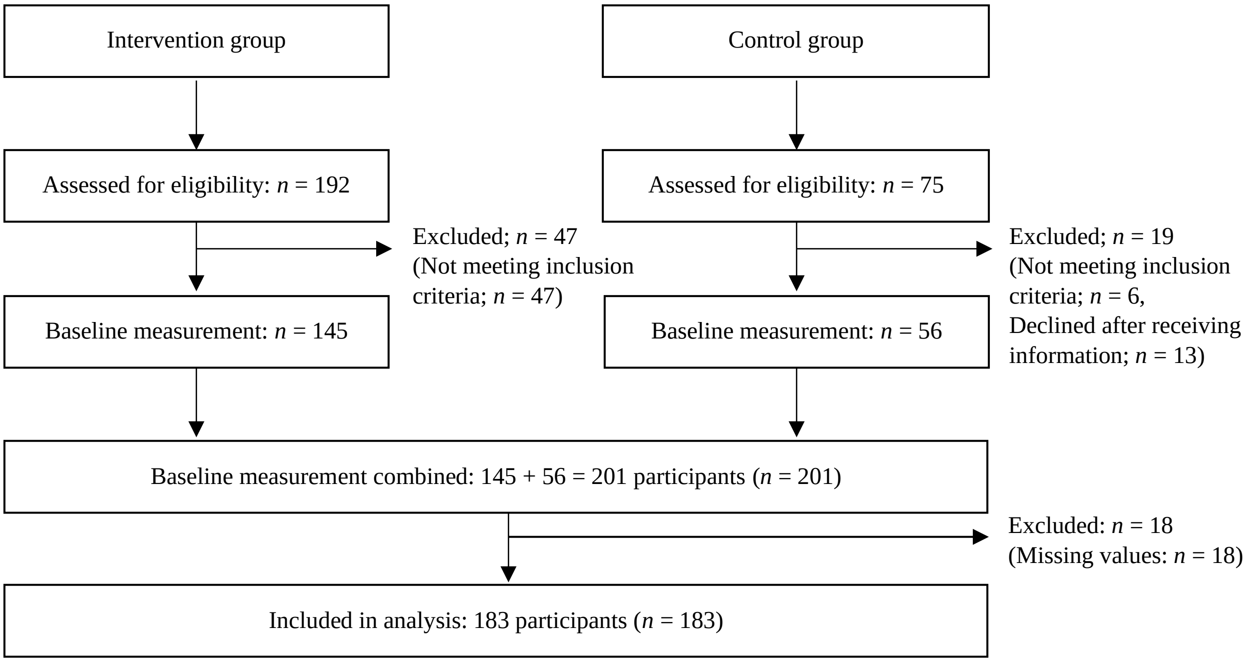
(December 2015) don't match due to uncertainty regarding the continuance of the study due to the early and limited availability of the simulator and a lack of funding. The non-invasive study imposed no risk on the participating caregivers or the care receivers.

Measures

Questionnaire - Depression and Anxiety. Levels of *Depression* and *Anxiety* were measured with the Hospital Anxiety and Depression Scale (HADS) (Spinhoven et al., 1997). It consists of seven statements, each regarding anxiety and depression within the week before the measurement, rated on a 4-point scale ranging from 0 to 3. The scores are added up within the subscales, and the cut-off of 8 is used as an indicator for anxiety or depressive complaints (0-7 = no or minimal symptoms, 8-10 = mild symptoms, 11-14 = moderate symptoms, 15-21 = severe symptoms). Scores range from 0 to 21 for each subscale, respectively. In different studies, Cronbach's alpha for the anxiety and depression subscale range from 0.76 to 0.93 and 0.72 to 0.90, respectively (Van Beljouw & Verhaak, 2010).

Figure 1.

Flowchart of the Participants Recruited and Included in the Analysis.



Questionnaire – Sense of Competence. Perceived *Sense of Competence* was measured with the Short Sense of Competence Questionnaire (Vernooij-Dassen et al., 1999). The seven items, rated on a 5-point Likert scale (1-5), consist of three domains: satisfaction with the person with dementia as a recipient of care, satisfaction with one's performance as a caregiver, and consequences of involvement in care for the personal life of the caregiver (Vernooij-Dassen et al., 1996). Possible scores range from 0 to 35, with higher scores indicating a greater sense of competence (7-21 = low sense of competence, 22-28 = moderate sense of competence, 29-35 high sense of competence). Cronbach's alpha is 0.76 (Vernooij-Dassen et al., 1999).

Procedure

This thesis is based on a longitudinal and quasi-experimental study with two groups (see Jütten et al. (2017) for the protocol). Participant recruitment started in 2014, and the final measurements took place in 2018. Recruitment was conducted in several organizations for elderly care and management (de Wever in Tilburg, the Netherlands; elderly federations; Alzheimer Nederland; case managers; centers for daytime activities for people with dementia and social media). The recruitment and scheduling process started with providing oral or written information about the study and scheduling the first appointment with interested parties. All participants gave their written consent. The measurement consisted of a semi-structured interview and a questionnaire packet. The investigated outcomes, *Anxiety* and *Depression*, and the caregiver's *Sense of Competence* (*SoC*) were measured with questionnaires. The interview was standardized and conducted by trained neuropsychologists, while the participants completed the questionnaires at home before the interview appointment. This process and the questionnaires were identical for both groups, except additional questions regarding the simulator were left out in the control group.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics 29. This study used data from the baseline measurement of both the intervention and control group since this assured the maximum amount of data available (*N* = 201), and the hypotheses do not regard pre- and post-measurements of the intervention or a comparison between the intervention and control group. A previous study by Jütten et al. (2018) has shown no significant differences between the control and intervention groups in the primary outcomes of competence, depression, and anxiety complaint at the baseline measurement. For this reason, the analysis included data from both groups. The data (*N* = 201) was checked for missing values, outliers, and statistical assumptions before analysis. Upon inspection of a boxplot, the identified outliers were deemed within the possible range of values and not considered extreme. Specifically, they were not greater than 1.5 box lengths from the edge of the box. Consequently, they were deemed suitable for inclusion in the analysis. Participants with missing values in the SSCQ or HADS were excluded from the analyses, resulting in a total number of 183 participants (*n* = 183) included in statistical analyses.

Descriptive statistics of participant characteristics of the caregivers and care receivers include all demographic variables measured at baseline. Additionally, all baseline scores on the independent variable and outcome questionnaires were analyzed.

The independent variable in this study is the *SoC* with three levels: *low SoC*, *moderate SoC*, and *high SoC*. To enable statistical analysis of the relationship between the independent variable and the outcome variables in a one-way MANOVA, the independent variable *SoC* was divided into three groups. Specifically, the original metric variable was converted into categories based on commonly used cut-offs for the SSCQ in the literature. Total scores of 7 to 21 points in the SSCQ were defined as a *low level of SoC* (coded 1), scores of 22 to 28 were defined as a *moderate level of SoC* (coded 2), and scores of 29 to the maximum of 35 were defined as a *high* *level of SoC* (coded 3). This split resulted in unequal group sizes of 35 (19.1%), 74 (40.4%), and 74 (40.4%), respectively. A contextual split, based on the participants' results in the SSCQ questionnaire, was chosen instead of a division based on distribution to better support the generalization of the results to other populations. Generalizability of results based on sample-specific criteria is limited due to variation of distribution in populations (DeCoster et al., 2011). Uneven group sizes when conducting a one-way MANOVA can result in a loss of power, limiting the ability to detect small effects. But all group sizes were greater than the number of dependent variables investigated (Stevens, 2012), fulfilling the sample size assumption of the MANOVA. Therefore, the one-way MANOVA was computed accepting the loss of power and using the interpretation of Pillai's Trace instead of Wilk's Lambda due to higher robustness given the unequal sample sizes (Ateş et al., 2019).

Preliminary Spearman correlation analyses for the total sample ($n = 183$) were conducted to examine the relationship between *SoC* and *Anxiety*, *SoC* and *Depression*, and *Anxiety* and *Depression* before investigating different levels of *SoC*. The means and standard deviations for *SoC* were 26.23 and 5.40, for *Anxiety* 6.66 and 4.07, and for *Depression* 4.87 and 3.99, respectively. The results of the Spearman correlation analysis revealed significant negative correlations between *SoC* and *Anxiety*, $\rho = -.48$, $p < .001$, and *SoC* and *Depression*, $\rho = -.44$, $p < .001$, indicating that as *SoC* increases, *Anxiety* and *Depression* decrease. The correlation coefficient suggests a moderate relationship between the variables. Furthermore, a strong positive correlation ($\rho = .69$, $p < .001$) was observed between Anxiety and Depression, suggesting that an increase in Anxiety is accompanied by a corresponding increase in Depression and vice versa.

A one-way MANOVA was performed to examine the effects of *SoC* (independent variable) on *Anxiety* and *Depression* (dependent variables). Post hoc univariate ANOVAs were conducted to investigate the significant effects of *SoC* on *Anxiety* and *Depression*, to answer the hypotheses of this study. Tukey-Kramer post hoc analyses for all significant ANOVA results were performed to explore which *SoC* groups differed in the dependent variable.

Statistical assumptions were tested before conducting the one-way MANOVA to ensure valid and reliable results. The dependent variables, namely *Anxiety,* and *Depression,* were measured on a continuous level using the HADS subscale sums. The equivalent distance between ratings justified using a MANOVA for higher power instead of a non-parametrical test. The independent variable *SoC* consisted of three categorical groups, and all observations were independent. In the data, two univariate outliers were identified through boxplot inspection. However, these were not excluded as they appeared to be genuine values rather than measurement or data entry errors. Furthermore, they did not exceed 1.5 box lengths from the box's edge. The data had no multivariate outliers, as determined by Mahalanobis distance ($p > .001$). The normality assumption was violated in some combinations of the SoC level and dependent variables, except for the HADS depression subscale in group 1 (Shapiro-Wilk test, $p > .05$). Despite the violation of the normality assumption, the analysis proceeded based on the large sample size and the robustness of MANOVA in handling deviations from normality (Stevens, 2012). Moderate multicollinearity was observed, as assessed by Pearson correlation ($r = .644$, $p < .001$). If outcome variables are uncorrelated or too strongly correlated, it can diminish the power of MANOVA power in controlling a Type I error, indicating the need for using univariate statistical tests instead (Finch & French, 2013). However, the present correlation was below the commonly recommended threshold of .90 (Grice & Iwasaki, 2008), justifying the use of the one-way MANOVA. A linear relationship between *Anxiety* and *Depression* scores was evident in the *moderate* and *high* categories of *SoC,* as observed from the scatterplot. However, the low SoC category did not exhibit a clear linear relationship. Although this violated the linearity assumption in one of the groups, the MANOVA was conducted, acknowledging the potential limitation on generalizability to populations where linearity conditions hold true (Stevens, 2012). Finally, Box's test of equality of covariance matrices supported homogeneity of variance-covariances matrices (p = .009), and Levene's Test of Homogeneity of Variance confirmed the homogeneity of variances (p > .05).

In addition to investigating the confirmatory hypotheses, the study conducted exploratory analyses to examine the relationship between caregiver demographic variables and the independent variable groups. A one-way ANOVA was performed to investigate possible differences between *SoC* groups for normally distributed continuous variables. Non-normally distributed continuous variables were analyzed using Kruskal-Wallis tests, while categorical variables were assessed using Pearson Chi-square tests. Exploratory Pearson correlations were used to explore the connection between *SoC*, *Anxiety,* and *Depression* with continuous variables. The study examined the relationship between these three variables and multinominal variables through one-way ANOVAs, while dichotomous categorical variables were analyzed using t-tests.

Power Analysis

A post hoc power analysis was conducted using G*Power 3.1.9.7 (Faul et al., 2007) to determine the achieved power of the one-way MANOVA with a 0.05 alpha level, an effect size of 0.15, and a sample size of 183. This study conducted a MANOVA on two dependent variables with an independent variable with three groups. The analysis revealed that the achieved power was 0.99, indicating a high probability of detecting small- to medium-sized effects.

Results

Caregiver and Care Receiver Characteristics

All statistical analyses were performed using IBM SPSS Statistics 29. Caregiver and receiver characteristics were analyzed for the total sample and the three separate SoC groups (see Table 1). Appropriate tests were conducted to detect possible significant differences between the three *SoC* levels. The mean age of the total sample was 59 (*SD* = 11.9) years. It decreased from the *low* (64.7±9.9) to *moderate* (61.5±12.1) to *high* (58.1±11.8) *SoC* level. There was a significant difference among the levels of *SoC*, *F*(2, 178) = 4.051, *p* = .019, with a small effect size of η^2 = .044. The effect size partial eta squared (η^2) is interpreted as a small effect within the range of .01 to .05, as a medium effect from .06 to .13, and as large equal to or above .14 (Cohen, 1988). Most caregivers were female (79.8% total, 77.1% in group 1, 79.7% in group 2, 81.1% in group 3), had an active occupation (66.7% total, 60% in group 1, 63.5% in group 2, 73% in group 3) and had provided care for several years at the time of the interview (total = 3.9±3.2, group 1 = 3.9±2.8, group 2 = 4.2±3.5, group 3 = 3.5±3.1). The groups did not differ on these demographic variables. Most caregivers of the total sample had a medium or high level of education (15.3% low, 36.1% medium, 48.6% high). Both the *moderate* and *high SoC* groups showed this distribution pattern (see Table 2), while the *low SoC* group did not (28.6% low, 40% medium, 31.4% high), indicating a higher frequency of low education than high in this group. This difference between the *SoC* groups was significant, $\chi^2(2) = 8.963$, *p* = .011. The number of weekly caregiving hours also differed significantly among the *SoC* groups ($\chi^2(2) = 24.406$, *p* < .001), with the *low* group reporting the most hours and the *high* group the least (total = 56.3±62.87, group 1 = 84.0±64.9, group 2 = 66.9±65.3, group 3 = 32.5±50.6). Moreover, the type of relationship with the care receiver showed significant differences, $\chi^2(8) = 29.478$, *p* < .001. Visual inspection suggests fewer spouses/partners (62.9% in group 1, 52.1% in group 2, 20.3% in group 3) but more adult children (28.6% in group 1, 35.6% in group 2, 60.8% in group 3) in group 3 than 1 and 2. Cohabiting with the care receiver also differed significantly, $\chi^2(2) = 24.130$, *p* < .001, with less cohabitation in the *high SoC* group than in *moderate* and *low* (58.8% in group 1, 53.4% in group 2, 18.9% in group 3).

Table 1

Descriptive Statistics Regarding Sociodemographic Caregiver and Care Receiver Characteristics

	Total N (*N* = 183)	low SoC (*n* = 35)	moderate SoC (*n* = 74)	high SoC (*n* = 74)	Test value[a]	*p*-value
Participant/Caregiver characteristics	N = 183	n1 = 35	n2 = 74	n3 = 74		
Age in years	60.7±11.8	64.7±9.9	61.5±12.1	58.1±11.8	4.05	.019*
Male sex	37 (20.2%)	8 (22.9%)	15 (20.3%)	14 (18.9%)	0.23	.892
Level of education[b]						
Low	28 (15.3%)	10 (28.6%)	11 (14.9%)	7 (9.5%)	8.963	.011*
Medium	66 (36.1%)	14 (40%)	28 (37.8%)	24 (32.4%)		
High	89 (48.6%)	11 (31.4%)	35 (47.3%)	43 (58.1%)		
Years of caregiving	3.9±3.2	3.9±2.8	4.2±3.5	3.5±3.1	3.54	.171
Hours of care per week	56.3±62.87	84.0±64.9	66.9±65.3	32.5±50.6	25.41	<.001**
Active occupation[c]	122 (66.7%)	21 (60%)	47 (63.5%)	54 (73%)	2.36	.308
Relationship with the care receiver						
Spouse/Partner	75 (41.2%)	22 (62.9%)	38 (52.1%)	15 (20.3%)	29.48	<.001**
Adult child	81 (44.5%)	10 (28.6%)	26 (35.6%)	45 (60.8%)		
Other	26 (14.2%)	3 (8.6%)	9 (12.4%)	14 (18.9%)		
Cohabiting with the care receiver[c]	73 (40.3%)	20 (58.8%)	39 (53.4%)	14 (18.9%)	24.13	<.001**
Care receiver characteristics						
Age in years	78.4±8.4	77.4±7.8	77.7±8.5	79.6±8.6	2.95	.229
Male Sex	80 (44.4%)	16 (45.7%)	40 (54.8%)	24 (33.3%)	6.79	.034*
Dementia diagnosis						
No differential diagnosis	7 (3.8%)	1 (2.9%)	3 (4.1%)	3 (4.1%)	21.45	.091
Alzheimer's dementia	107 (58.8%)	17 (48.6%)	44 (60.3%)	46 (62.2%)		
Parkinson's dementia	2 (1.1%)			2 (2.7%)		
Vascular dementia	33 (18.1%)	10 (28.6%)	14 (19.2%)	9 (12.2%)		
Other forms of dementia	10 (5.5%)		3 (4.1%)	7 (9.5%)		
Unknown	19 (10.4%)	7 (20%)	6 (8.2%)	6 (8.1%)		
Time since most recent diagnosis	3.1±2.5	3.2±2.7	3.4±2.6	2.8±2.3	1.84	.399

Note. Values are presented as mean ± SD or n (%). SoC, Sense of Competence categories.

[a] Test values: *F* values for normally distributed continuous variables; Kruskal-Wallis tests χ^2 values for non-normally distributed continuous and ordinal variables; Pearson χ^2 values for categorical variables.

[b] Level of education categorized, according to Verhage (1964), as low (1–4), medium (5), or high (6–7).

[c] Reflects the number and percentage of participants answering "yes" to this question.

*$p < 0.05$, ** $p < 0.01$.

The only significant difference between levels of *SoC* regarding care receiver characteristics was found with gender $\chi^2(2) = 6.790$, $p = .034$. Post hoc analysis of pairwise comparisons using the z-test of two proportions with a Bonferroni correction was conducted. The proportion of care receivers being male in the *moderate* and *high* SoC was significantly different, $p < .05$. The ratio between *low* (45.7%) and *moderate* (54.8%), as well as between *low* and *high* (33.3%) *SoC* was not significantly different, $p > .05$. These results indicate more male care receivers in group 2 than in 3 but not more than in 1. The mean age of care receivers was similar between the total and the *SoC* groups (total = 78.4±8.4, group 1 = 77.4±7.8, group 2 = 77.7±8.5, group 3 = 79.6±8.6). Most care receivers were diagnosed with Alzheimer's dementia (58.8% total, 48.6% in group 1, 60.3% in group 2, 62.2% in group 3) or Vascular dementia (18.1% total, 28.6% in group 1, 19.2% in group 2, 12.2% in group 3) and had received their most recent diagnosis several years ago (total = 3.1±2.5, group 1 = 3.2±2.7, group 2 = 3.4±2.6, group 3 = 2.8±2.3). The groups did not differ on these demographic variables.

Investigating Sense of Competence with Anxiety and Depression

There was a statistically significant multivariate main effect of the *SoC* levels on the dependent variables, $F(4, 360) = 14.639$, $p < .001$; Pillai's Trace = .280. Partial $\eta^2 = .140$ indicated a large effect. Follow-up analysis on *Anxiety* and *Depression* showed homogeneity of variances, as assessed by Levene's test for equality of variances, $p = .454$ and $p = .234$, respectively. Univariate ANOVAs revealed that participants' *Anxiety* was affected by *SoC*, $F(2, 180) = 32.056$, $p < .001$. Partial $\eta^2 = .263$ indicated a large effect. *Depression* was also significantly affected by *SoC*, $F(2, 180) = 17.400$, $p < .001$. Partial $\eta^2 = .162$ indicated a large effect. Tukey-Kramer tests were conducted to investigate the hypotheses that higher *SoC* is predictive of a lower level of *Anxiety* and *Depression* and that lower *SoC* is predictive of a higher level of *Anxiety* and *Depression*. The level of statistical significance was adjusted for multiple comparisons with a Bonferroni correction, and the acceptance of statistical significance was set at $p < .025$. The *Anxiety* score decreased from the *low* ($M = 10.71$, $SD = 0.59$) to the *moderate* ($M = 6.43$, $SD = 0.41$) and *high* ($M = 4.97$, $SD = 0.41$) *SoC* group, in that order (see Table 1 and Figure

2). The analysis revealed that the mean decrease from *low* to *moderate* (-4.28, 95% CI [-5.98, -2.58], *p* < .001) as well as the decrease from *low* to *high* (-5.74, 95% CI [-7.44, -4.04], *p* < .001), were statistically significant. The *moderate* to *high* decrease was insignificant (-1.46, 95% CI [-2.82, -0.1], *p* = .033). The *Depression* score decreased from the *low* (*M* = 7.74, *SD* = 0.62) to the *moderate* (*M* = 5.07, *SD* = 0.43) and *high* (*M* = 3.32, *SD* = 0.43) *SoC* groups, in that order. Tukey-Kramer post hoc analysis revealed that the mean decrease from *low* to *moderate* (-2.68, 95% CI [-4.45, -0.9], *p* = .001), as well as the decrease from *moderate* to *high* (-1.74, 95% CI [-3.17, -0.32], *p* = .012), and *low* to *high* (-4.42, 95% CI [-6.20, -2.64], *p* < .001) was statistically significant. Participants with *low*, *moderate,* and *high SoC* showed higher *Anxiety* than *Depression* scores (see Table 2).

Overall, a *low SoC* was associated with higher *Anxiety* and *Depression* scores than *moderate and high SoC,* and *moderate SoC* was associated with higher *Anxiety* and *Depression* scores than *high SoC* but lower scores than *low SoC*. *High SoC* was associated with the lowest Anxiety and Depression scores.

Table 2

Statistics Regarding Questionnaire Data

	Total (*n* = 183)	low SoC (*n* = 35)	moderate SoC (*n* = 74)	high SoC (*n* = 74)	Test value^a	*p*-value
Questionnaires						
SSCQ (7-35)	26.2±5.4	17.7±3.2	25.3±2.1	31.2±1.6		
HADS – anxiety subscale (0-21)	6.7±4.1	10.7±3.8	6.4±3.4	5.0±3.5	32.06	< .001**
HADS – depression subscale (0-21)	4.9±4.0	7.7±4.2	5.1±3.8	3.3±3.2	17.40	< .001**

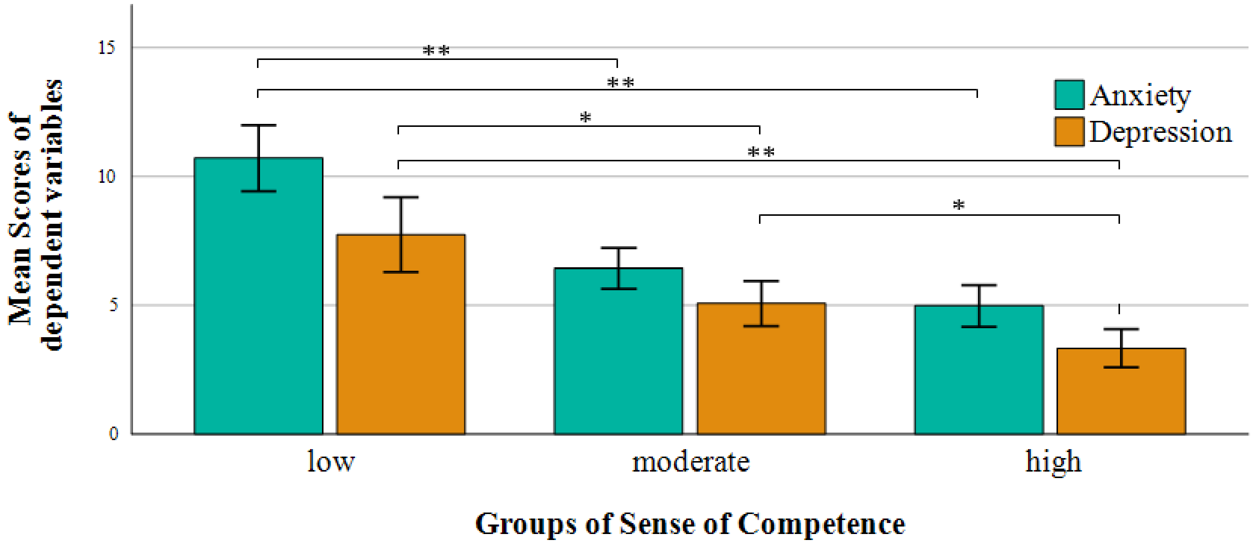
Note. This table entails the means and standard deviations of the questionnaire data for all participants and the respective SoC categories. Values are presented as mean ± SD. SSCQ, Short Sense of Competence Questionnaire; HADS, Hospital Anxiety and Depression Scale.

[a] Test values for outcomes: univariate ANOVAs with *F* values for normally distributed continuous variables.

*$p < 0.05$, ** $p < 0.01$.

Figure 2

Mean Scores of Anxiety and Depression in the Three Levels of Sense of Competence



Note. Mean scores of the HADS Anxiety and Depression subscales are shown for the different levels of *Sense of Competence*. Error bars represent standard errors.
*$p < 0.025$, ** $p < 0.01$.

Exploring Connections: Effects of Demographic Variables

Tukey-Kramer post hoc analyses of the caregivers' age differences revealed that the mean decrease in age from *low* to *high* (-6.64, 95% CI [-12.39, -0.89], $p = .033$) was statistically significant. The decrease from *low* to *moderate* (-3.16, 95% CI [-8.91, 2.59], $p = .379$) as well as from *moderate* to *high* (-3.47, 95% CI [-7.99, 1.04], $p = .167$) was not significant. Exploratory analysis revealed that caregiver age was correlated with *SoC* ($r(179) = -.25$, $p < .001$) and *Depression* ($r(179) = .26$, $p < .001$), but not *Anxiety* ($r(179) = .13$, $p = .083$). These results indicate that caregiver age explained 6.25% of the variability in *SoC* and 6.76% in *Depression*.

Pairwise comparisons using Dunn's (1964) procedure were performed to investigate the difference in caregiver level of education within the *SoC* groups. A Bonferroni correction for multiple comparisons was made with statistical significance accepted at the $p < .017$ level. The comparison revealed significant differences in the level of education between the *low* (mean rank

= 72.43) and *high* (mean rank = 102.09) (p = .003), but not between *moderate* (mean rank = 91.17) and *high* (p = .170) and *low* and *moderate* group (p = .059), indicating a higher prevalence of lower level of education in group 1 than in 3. An exploratory one-way ANOVA with a Bonferroni correction was conducted and revealed a significant variation of *SoC* across different levels of education, as indicated by a significant main effect of education, $F(2, 180) = 4.855$, $p = .009$. Partial $\eta^2 = .051$ indicates a small-sized effect. Depression ($F(2, 180) = 3.311$, $p = .039$), and Anxiety did not show this ($F(2, 180) = 1.464$, $p = .234$).

Dunn’s pairwise comparison was also performed to investigate the reported hours of care per week. A Bonferroni correction for multiple comparisons was made with statistical significance accepted at the $p < .017$ level. The comparison revealed significant differences in hours of care per week between the *low* (mean rank = 119.26) and *high* (mean rank = 68.99) ($p < .001$) as well as the *moderate* (mean rank = 99.46) and *high* ($p < .001$) *SoC* groups, but not between the *low* and *moderate* group (p = .064), indicating more hours of care per week in group 1 and 2 than in 3. The visible distribution across the sample revealed striking floor and ceiling effects of the care hours per week (see Appendix A). Some participants likely answered the item with their ‘active care hours’ and others with their ‘potential care hours.’ This distinction was not specified in the questionnaire item (“Hoeveel uren per week besteedt u (gemiddeld) aan de zorg en ondersteuning voor uw persoon met dementia?” [Translation: "How many hours per week do you spend (on average) on the care and support of your person with dementia?"]). The potential discrepancy in interpretation made a valid interpretation problematic. Therefore, this study did not include further exploratory analysis of this variable and its possible correlation to *SoC, Anxiety,* and *Depression*.

This study also investigated the kind of relationship with the care receiver. Given the exploratory nature of the following analysis, proportions of the categories spouse/partner and adult children were compared, leaving out other relationships. The difference was significant, $\chi^2(2) = 21.963$, $p < .001$. Post hoc analysis involved pairwise comparisons using the z-test of two proportions with a Bonferroni correction. The proportion of caregivers being the spouse/partner of the care receiver in the *low* (68.8%) and *moderate* (60.0%) *SoC* group was significantly higher than in the *high* (25.0%) group, $p < .05$. The proportion of caregivers being the child of the care receiver in group 1 (31.2%) and 2 (40.0%) was lower than in group 3 (75.0%). The proportion between *low* and *moderate* SoC was not significantly different, $p > .05$. These results indicate fewer spouses/partners but more adult children in group 3 than in 1 and 2. Independent-sample t-tests were run to determine if there were differences in *SoC*, *Anxiety,* and *Depression,* respectively, between partners/spouses and adult children. The mean difference in *SoC* between partners/spouses (23.95±5.04) and adult children (27.75±5.2) was statistically significant, with a mean difference of -3.8 (95% CI, -5.42 to -2.19), $t(155) = -4.652$, $p <.001$, $d = - .74$, indicating a medium-sized effect. The interpretation of Cohen's *d* effect size is based on Cohen's guidelines (small effect from 0.2 to 0.49, medium effect from 0.50 to 0.79, large effect ≥ 0.8) (Cohen, 2013). *Anxiety* was higher in partners/spouses (7.62±4.12) compared to adult children (6.2±4.27), with a significant difference of 1.4 (95% CI, 0.10 to 2.75), $t(155) = 2.12$, $p = .018$, $d = .34$, indicating a small effect size. *Depression* was higher in partners/spouses (6.57±4.09) compared to adult children (3.6±3.51), with a significant difference of 2.9 (95% CI, 1.76 to 4.16), $t(155) = 4.873$, $p < .001$, $d = .78$, indicating a medium effect size.

Cohabiting with the care receiver also differed significantly between *SoC* groups, $\chi^2(2) = 24.130$, $p < .001$, with less cohabitation in the *high SoC* group than in *moderate* and *low* (58.8% in group 1, 53.4% in group 2, 18.9% in group 3). Pairwise comparisons using the z-test of two proportions with a Bonferroni correction revealed that the proportion of caregivers living with the care receiver in the *low* (58.8%) and *moderate* (53.4%) *SoC* group was significantly higher than in the *high* (18.9%) *SoC* group, $p < .05$. The proportion between *low* and *moderate SoC* was not significantly different, $p > .05$. These results indicate less cohabiting in group 3 than in 1 and 2. Independent-sample t-tests were run to determine if there were differences in *SoC*, *Anxiety*, and *Depression* between cohabiting with the care receiver and not cohabiting. *SoC* was lower with cohabiting (23.93±4.94) compared to not (27.74±5.15), a significant difference of -3.91 (95% CI, -5.42 to -2.39), $t(179) = -5.092$, $p < .001$, $d = -.77$, indicating a medium-sized effect. *Anxiety* was higher when cohabiting (7.75±4.16) compared to not (5.92±3.88), with a significant difference of 1.84 (95% CI, 0.64 to 3.03), $t(179) = 3.304$, $p = .003$, $d = .46$, indicating a small effect size. *Depression* was also higher when cohabiting (6.68±3.99) compared to not (3.61±3.45), with a significant difference of 3.07 (95% CI, 1.97 to 4.17), $t(179) = 5.516$, $p < .001$, $d = .84$, indicating a large effect size.

Discussion

This study aimed to examine whether a higher *Sense of Competence* predicted lower *Depression* and *Anxiety* in caregivers of people with dementia. A higher *Sense of Competence* was associated with lower levels of *Depression* and *Anxiety*, while a lower *Sense of Competence* was linked to higher levels of *Depression* and *Anxiety*. A moderate *Sense of Competence* was linked to levels of *Depression* and *Anxiety* among those found connected to a lower and higher *Sense of Competence*. Moreover, the analysis indicated a significant decrease in *Anxiety* from *low* to *moderate* and *low* to *high* levels of competence. Only the decrease from *moderate* to *high* was not significant. Similarly, depression showed a significant decrease from *low* to *moderate*, *moderate* to *high*, and *low* to *high* levels of competence. The results of this study were as expected and in line with both confirmatory hypotheses. Additionally, this study found significant differences between the *Sense of Competence* groups regarding caregiver age, level of education, weekly care hours, relationship status, and cohabitation with the care receiver.

Exploratory analysis revealed that higher caregiver age, less education, spousal relationship status, and cohabitation with the care receiver were connected to a lower Sense of Competence.

The results align with previous research on competence and depression in informal caregivers of people with dementia. This present study shows that lower competence is associated with higher depressive symptoms and higher perceived competence is associated with lower depression, as indicated by van der Lee et al. (2014) and Ying et al. (2018). Similar evidence of this association has also been found when investigating depressive symptoms as the predictor of competence in caregivers (Lau & Cheng, 2017).

The results add to the inconsistent research on competence connected to anxiety (Cooper et al., 2007). Anxiety is common in informal caregivers (Mahoney et al., 2005) and related to CB and lower health (Cooper et al., 2007). Even though the total sample in this study showed anxiety levels below the clinically relevant cut-off scores, the low competence group showed a prevalence of clinically relevant anxiety scores. Additionally, significant differences in anxiety severity between competence levels were revealed. The SSCQ is short and measures satisfaction with the care recipient and one’s own performance as a caregiver, as well as the consequences of caregiving for the caregiver's personal life (Vernooij-Dassen et al., 1999). However, it does not measure ‘understanding’ and knowledge of caregiving, which limits the comparison to other studies investigating caregiver competence. Differences in operationalization can indicate that different aspects of competence in caregivers might be related to anxiety and depression, possibly in distinct ways. A study by Proctor et al. (2002) shows that too little knowledge, limited to biomedical aspects rather than knowing how to care and cope with a person with dementia, is associated with higher anxiety, indicating the necessity of improving informal caregiver knowledge. Hepburn et al. (2001) found that a higher level of understanding and knowledge about dementia and what the individuals involved need is associated with less caregiver depression and CB. The present study did not investigate the knowledge aspect of competence but rather the perceived satisfaction and influence of caregiving on the caregiver's life. Lower satisfaction with the care receiver and one's performance, as well as greater consequences to the caregiver's life, and therefore the sense of competence as measured with the SSCQ, are associated with higher anxiety and depression. This is in line with a study by Roff et al. (2004), showing that competence in the sense of feeling useful, appreciated, and satisfied with caregiving is associated with less anxiety. Previous research supports this finding and indicates that this association can go both ways: High satisfaction is associated with lower burden (Steadman et al., 2007) and lower burden predicts higher satisfaction in caregivers (De Labra et al., 2015). Less life satisfaction in caregivers has been investigated and found to be connected to caregiver depression but research regarding the association to anxiety has been relatively scarce (Cooper et al., 2007). This present study provides valuable insight into how high caregiver anxiety, in addition to depression, is connected to lower satisfaction as measured with the SSCQ.

The strengths of this study lie in its large sample size, multivariate approach, and contribution to understanding caregiver anxiety and depression. The utilization of a large sample size resulted in relatively high statistical power, enabling robust analysis and a high probability of detecting even potential small to medium effects. The multivariate approach of simultaneously analyzing the relationship of *SoC* to both *Anxiety* and *Depression* provides a more holistic indication of the importance of caregiver competence on caregiver well-being. The commonly measured concept of CB entails aspects of depression and anxiety (George & Gwyther, 1986; Liu et al., 2020), and this study was able to underline the importance of these psychological difficulties in informal caregivers of dementia patients concerning their perceived competence. Utilizing a one-way MANOVA heightened the statistical power in investigating the correlated variables of *Anxiety* and *Depression* compared to conducting separate univariate analyses for each variable. Focused univariate follow-up analyses based on the significant result of the joint effect revealed the independent significance of both outcome variables as distinct aspects of the variable under study. Exploring the hypothesized pattern between the different levels of the independent variable provided a deeper understanding of the association discovered in the initial MANOVA result. Looking at *SoC* as the predictor of *Depression* and *Anxiety* means looking at a modifiable factor of informal dementia caregiving. The present study successfully replicated the association between higher SoC and lower levels of Depression and further expanded this relationship to include Anxiety. Investigating and improving the sense of competence in caregivers may be a way to improve feelings of anxiety and depression, improve the quality of life, and reduce CB in caregivers (Gilhooly et al., 2016).

Having discussed the strengths and contributions of this study to the field of dementia care, it is also necessary to address possible influences of other variables that should be considered when interpreting the findings. Several caregiver characteristics significantly differed between the three *SoC* levels, possibly influencing or moderating the investigated association between competence and anxiety, and depression.

More caregivers in the *low* and *moderate SoC* compared to the *high* group were spouses/partners than adult children of the care receiver, and the opposite was true for the *high SoC* group. Research suggests that there is no clear association between the kind of caregiver/care receiver relationship and anxiety (Cooper et al., 2007) but that spouses, in general, show higher rates of depression compared to adult children (Covinsky et al., 2003; Ying et al., 2018). These outcomes align with the results of the present study indicating a possible influence of relationship status on the association between competence and depression and anxiety. Further exploratory analysis of the total sample revealed that the relationship status was connected to caregivers' *SoC*, A*nxiety,* and *Depression*, with spouses having less *SoC* and higher *Depression* and *Anxiety* than adult children. Advanced age was also associated with decreased *SoC* and increased *Depression* but had no significant effect on *Anxiety*, possibly indicating an influence of relationship status beyond being merely an indicator for age. Research comparing spouses/partners and adult children in caregiving suggests differences in how they are affected by patient behavior (Pinquart & Sörensen, 2003), patient mood (Donaldson et al., 1998), and the amount of caregiving (Lawton et al., 1991). Not surprisingly, this present study found a small but significant difference in caregiver age between the *low* and *high SoC* groups, indicating that the *low* group is, on average several years older than the *high* group. Cooper et al. (2007) showed that caregiver age and anxiety are not linked, but Covinsky et al. (2003) showed that higher caregiver age is associated with more depressive symptomatology. These results are in line with the exploratory analysis indicating a correlation between age and *Depression*. The additional negative correlation to *SoC* reveals a connection between not only SoC and the investigated outcome variables but also a possible influence of age on this association.

Another interesting finding is that more caregivers of the *low* and *moderate SoC* group cohabited with the care receiver compared to the *high* group. Exploratory analyses of the present study revealed lower *SoC* and higher *Anxiety* and *Depression* in caregivers living with the care receiver compared to those not cohabiting, indicating an influence of the living situation on the investigated variables. Previous research supports this connection of cohabitation to depression and CB. Research links cohabiting with the care receiver to greater rates of depression (Covinsky et al., 2003) and poorer psychological well-being (Brini et al., 2022). The link with anxiety is less clear (Cooper et al., 2007). A study by Mahoney et al. (2005) suggests that caregivers living with the care receiver are more likely to be anxious rather than depressed. Another found no association between anxiety and cohabiting (Brini et al., 2022). This present study supports that cohabitation might negatively affect the *SoC* in informal caregivers and possibly *Depression* and *Anxiety*.

High perceived competence of informal caregivers enables them to be better equipped for the challenges of providing care on average for 35-63 hours per week (McDaid, 2001; Wimo et al., 2013). The studied population provided care on average for 32-84 hours per week. The *low* and *moderate SoC* groups provided significantly more hours of care than the *high SoC* group, which could influence the severity of depression and anxiety symptoms. The direction of this possible influence is not yet clear, as studies suggest contradictory effects on anxiety and depression. More hours of care per week are associated with less anxiety and, conversely, higher depression (Covinsky et al., 2003; Ying et al., 2018). A possible influence of the difference in hours on the outcome variables in this study cannot be excluded due to further exploratory analysis not being advisable. While some participants likely answered the item with their ‘active care hours,’ others might have indicated their ‘potential care hours.’ As both might impact the perceived burden and *SoC* differently, a clarified instruction would provide more transparent data. We further suggest including both types of care hours in future research to study the effects of active care hours in contrast to potential care hours.

The caregivers' education level was significantly different between the *low* and *high* levels of *SoC,* with more highly educated participants in the *high* group compared to the *low* group. A confounding effect of years of education on competence cannot be explicitly excluded because exploratory analyses revealed a significant variation of *SoC* across different levels of education with a small-sized effect. Higher caregiver satisfaction has been linked to a higher educational level (Lee et al., 2001). The present study using the SSCQ and therefore measuring satisfaction rather than knowledge of dementia supports this and reveals a possible small influence of this association on the relationship between competence and anxiety, and depression.

While this study provides valuable insights into the importance of competence in caregivers, it is important to recognize the limitations inherent in the research design and methodology. A limitation is the dichotomization of the continuous independent variable *SoC*, which resulted in uneven sample sizes, with the *low* group being considerably smaller than the *moderate* and *high* groups. Given the relatively large sample size and using the more robust measure of Pillai's trace instead of Wilk's Lambda, the impact on the MANOVA's power was limited. Future research should increase the sample size even more to mitigate the effect of variable group sizes or use non-parametric alternatives to replicate the investigated relationship of SoC with Anxiety and Depression. Utilizing matching or stratified sampling based on relevant demographic variables such as caregiver age poses alternative approaches. Two one-way MANOVA assumptions were violated, namely normality in two groups (*moderate* and *high SoC*) and linearity in one (*low SoC)* of three groups. The loss of power and limitation of generalizability of the results to populations where linearity is given was judged as acceptable in view of the relative robustness and low type I error rate of a one-way MANOVA to normality deviations with a large sample size (Finch, 2005; Stevens, 2012). Future research should address these violations nonetheless by replicating the results with alternative use of appropriate non-parametric procedures or data transformation.

This study aimed to investigate *SoC* as a possible modifiable caregiver characteristic in reducing *Depression* and *Anxiety* and provide evidence for further research to improve quality of life and reduce CB in caregivers (Gilhooly et al., 2016). Investigating possible covariables proposed in this study (namely caregiver age, hours of care, relationship to the care receiver, cohabitation, and level of education) in future research should yield important insight into the influential factors of competence and its effect on informal caregivers' well-being. Another imperative aspect of broadening the understanding of caregiver competence and its connection to depression and anxiety is using additional competence measurements. Competence, as measured in this present study, was limited to perceived satisfaction and consequences of caregiving for the caregiver's personal life (Vernooij-Dassen et al., 1999). Possible additional factors are biomedical knowledge, such as information about the progression of different types of dementia, expertise regarding how to care for a person with dementia, and the ability to cope with caregiving (Le Deist & Winterton, 2005; Proctor et al., 2002).

Conclusion

In summary, this study demonstrates that a higher sense of competence is associated with less anxiety and depression in informal caregivers of a person with dementia, highlighting the importance of enhancing perceived competence as a potential direction for interventions to decrease caregiver anxiety and depression. By addressing these crucial aspects of caregiver well-being, better care outcomes for care receivers can be achieved (Gauthier et al., 2022; Olazarán et al., 2010). Supporting caregiver satisfaction and mitigating the negative impact of caregiving on their personal life are amendable factors in improving the lives of informal caregivers and their care receivers, presenting an opportunity to intervene in the early stages of dementia progression (Pot & Petrea, 2013). Clinicians and social services should prioritize early detection and enhancement of informal caregiver competence, as low competence levels pose a risk factor for anxiety and depression.

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Appendix A

Histogram of the Hours of Care per Week of the Total Sample