2019

Effects of Positive Thinking on Dementia Caregivers' Burden and Care-Recipients' Behavioral Problems

Abir K. Bekhet

Mauricio Garnier-Villarreal

Effects of Positive Thinking on Dementia Caregivers' Burden and Care-Recipients' Behavioral Problems

Abir K. Bekhet
College of Nursing, Marquette University, Milwaukee, WI
Mauricio Garnier-Villarreal
College of Nursing, Marquette University, Milwaukee, WI

Abstract

Most dementia care is provided at home by family members. This caregiving places an additional burden on the family members, which can negatively impact their physical and psychological well-being. The caregivers' burden can also contribute to behavioral problems in the care-recipients. The purpose of this study was to examine the mediating/moderating effects of positive thinking (PT) on the relationship between caregivers' burden (embarrassment/anger, patient's dependency, and self-criticism) and their care-recipients' behavioral problems (memory, depression, and disruption) in a sample of 100 dementia caregivers. Results indicated that caregivers' embarrassment, self-criticism, and perception of patient dependency predicts depression in care-recipients, and these relationships are moderated by PT. Results also indicated that as PT increases, the

relationship between embarrassment and disruption goes down as well as does the relationship between self-criticism and depression. The study provided direction for the development of a PT training intervention to help caregivers to combat their burden.

Keywords

dementia caregivers, positive thinking, behavioral problems, burden

Dementia and Alzheimer's disease is a significant public health challenge (Rocca et al., 2011). According to the Alzheimer's Association, 5.8 million Americans are living with the disease, and it is projected that its prevalence is expected to rise to 14 million by 2050 (Alzheimer's Association, 2019). Currently, Alzheimer's and other dementias cost the nation approximately $290 billion annually; this number will rise to an estimated $1.1 trillion by 2050 (Alzheimer's Association, 2019). As the sixth leading cause of death in the United States, dementia also has an impact on individuals' memory and thinking, and can eventually affect their abilities to manage daily activities (Alzheimer's Association, 2019; Bekhet & Garnier-Villarreal, 2018; Papastavrou, Kalokerinou, Papacostas, Tsangari, & Sourtzi, 2007). Most dementia care is provided at home by family members, which can negatively impact caregivers' physical and psychological well-being. A wide range of caregivers' emotions and reactions have been identified in the literature, ranging from fatigue and feelings of confusion and uncertainty to depression and poor self-rated health (Bekhet, 2013; Coon et al., 2004; Papastavrou et al., 2007). Yet, at the same time, caregivers' burden can increase the behavioral problems of dementia patients (Alzheimer's Association, 2019).

The effects of positive thinking (PT) on caregivers' burden and on their care-recipients' behavioral problems has not been addressed before. Therefore, this study was designed to address the gap in current research with dementia family caregivers. The purpose of this study is to examine the mediating and/or the moderating effects of PT on the relationship between caregivers' burden and their care-recipients' behavioral problems. The results of this study will act as a guide to develop a PT training intervention to help caregivers of persons with dementia to overcome their burden, which will in turn improve their care-recipients' behavioral problems.

Theoretical Framework

The proposed study is based on resilience theory wherein resilience is an interaction between risk and protective factors in the face of adversity (Luthar, Cicchetti, & Becker, 2000; VanBreda, 2001). The burden of caring for a person with dementia is a risk factor, defined as "a multidimensional response to the physical, psychological, emotional, social, and financial stressors associated with caregiving" (Sharma, Chakrabarti, & Grover, 2016, p. 10). Protective factors can increase resilience by minimizing the effects of risk factors and negative reactions (Greene, 2008). The protective factor to be examined in this study will be PT. This is a cognitive process that helps individuals to develop optimistic ideas, make sound decisions, and increase their abilities to cope with challenging situations (Bekhet & Zauszniewski, 2013). PT has been identified as a helpful strategy for coping with adverse situations (Naseem & Khalid, 2010; Tod, Warnock, & Allmark, 2011), and has been correlated with better quality of life and improved psychological and physical well-being (Dekker, Peden, Lennie, Schooler, & Moser, 2009; Lightsey & Boyraz, 2011). However, previous research has not examined the mediating and/or moderating effects of PT on the relationship between caregivers' burden and their care-recipients' behavioral problems as proposed in this study. The behavioral problems of persons with dementia include a wide range of psychological reactions and psychiatric symptoms and represent an important clinical dimension of dementia. Dealing with these behavioral problems, and their frequency, constitute the burden placed upon caregivers, yet, at the same time, caregivers' burden can also increase the behavioral problems of persons with dementia.

PT was hypothesized in this study as a mediating and/or moderating variable between caregivers' burden and their care-recipients' behavioral problems. The mediator model is one that partitions the effect of a predictor on an outcome variable into direct and indirect effects. The indirect effect represents the portion of the effect that the predictor has through the mediator because of the effect that it has on the mediator variable. The direct effect is the portion of the effect that the predictor has on the outcome, which is by itself above and beyond the mediator variable. The moderator model evaluates how a third variable (moderator) changes the strength and direction of the regression between the other two variables (Darlington & Hayes, 2017).

The purpose of the study was to determine whether positive cognitions will mediate and/or moderate the relationship between caregivers' burdens (embarrassment/anger, patient's dependency, and self-criticism) and their care-recipients' behavioral problems (memory, depression, and disruption). Additionally, the study has provided a base for developing a PT training intervention to enhance the abilities of dementia caregivers to overcome their burden, which in turn will enhance their care-recipients' behavioral problems.

Methods

Research Design

A descriptive, correlational, cross-sectional design was used to examine the relationships among the study variables.

Subjects

A convenience sample of 100 caregivers of persons with dementia was used. Inclusion criteria for this study consisted of the ability to read and understand English and of being the caregiver of a person with dementia. The sample size of 100 subjects was determined using G*Power with an $\alpha = .05$, $\beta = .8$, and $f\ 2 = .1$ for a small to medium effect size (Faul, Erdfelder, Lang, & Buchner, 2007).

Setting

Subjects were recruited from the Alzheimer's Association–Southeastern Wisconsin Chapter as well as from its "Walk to End Alzheimer's" fundraising event. The process started by obtaining approval from the Institutional Review Board; then Alzheimer's Association administrators were contacted to help researchers in recruiting subjects. Board-approved flyers were posted in the chapter offices and distributed to "Walk to End Alzheimer's." Those who were interested contacted the research assistants. On an agreed upon date and time, the research assistants met with the subjects to explain the purpose of the study, administer consent forms, and distribute questionnaires. At that meeting, research assistants doubled-checked the completed questionnaires in order to minimize missing data.

Measures

Data were collected based on the contextual factors of the family caregivers, the persons with dementia, and the caregiving situation. For caregivers, the following demographic data were collected: age, gender, education, race, income, marital status, and perceived health status. Perceived health status was measured by a 4-point Likert scale in which caregivers were asked to rate their present health (1 = poor to 4 = excellent), with higher scores indicating better health (Musil, Haug, & Warner, 1988). For persons with dementia, the following demographic data were collected: age, gender, race, and years since diagnosis. For the caregiving situation, caregivers were asked to indicate their relationship to the patient, the living arrangement (living with or apart from the persons with dementia), and the amount of caregiving provided (direct or indirect care).

Caregiver burden was measured by the 22-item Zarit Burden Interview (Zarit, Reever, & Bach-Peterson, 1980). Cronbach's alphas ranging between 0.88 and 0.92 have been reported (Zarit et al., 1980). The Zarit Burden Interview is a 5-point Likert scale ranging from never (0) to nearly always (4) and it asks caregivers to indicate the burden that they might feel during caregiving. The interview has three factors, namely, embarrassment/anger, patient dependency, and self-criticism.

The Positive Thinking Skills Scale (PTSS) is an 8-item scale that measures PT (Bekhet & Zauszniewski, 2013). The PTSS is a 4-point Likert scale ranging from 0 = never to 3 = always. The scale has a Chronbach's alpha of 0.90. Construct validity was confirmed by correlations with theoretically related constructs, namely, positive cognitions ($r = 0.53$, $p < 0.01$) and depression ($r = -0.45$, $p < 0.01$; Bekhet & Zauszniewski, 2013).

The Revised Memory and Behavior Problems Checklist (RMBPC) is the subscale on the frequency of a person with dementia behavior (Teri et al., 1992). The RMBPC is a 24-item scale that assesses the persons with dementia behaviors. Behaviors are rated by caregivers from never occurs (0) to occurs daily or more often (4). Chronbach's alpha reported in a previous study was 0.89 (Teri et al., 1992). The RMBPC has three factors, namely, memory, depression, and disruption.

Data Analysis

Data analysis was done in R (R Core Team, 2018). The data analysis approach used Structural Equation Modeling (SEM) with the R package lavaan (Rosseel, 2012). This approach has the advantage of reducing instrument measurement error and estimating a more precise measure of the latent factor underlying the scale items (Kline, 2015; Little, 2013; McArdle & Nesselroade, 2014). As presented by Raykov (2012), the SEM framework presents beneficial conditions to develop and test scales, such as evaluation of multidimensional structures, correlations between constructs, evaluation of multiple reliability measures, and correction for measurement error.

Missing data were handled with Multiple Imputation, a modern method to properly handle missing data, improve parameter recoverability, reduce bias, and increase power (Baraldi & Enders, 2010; Enders, 2010; van Buuren, 2012). We generated 100 imputations with the R package mice (van Buuren & Groothuis-Oudshoorn, 2011), and the imputations were analyzed with the semTools package (Jorgensen, Pornprasertmanit, Schoemann, & Rosseel, 2018).

Reliability was evaluated with the maximal reliability (MR) coefficient. MR estimates the reliability of a scale assuming items have different weights and is the maximal possible reliability for a linear combination of the scale items. MR involves the estimation of the optimal linear combination, which represents different item weights for MR. MR measures reliability of a scale, unlike Cronbach's alpha, which estimates inter-item correlation (Li, 1997; Raykov, 2012). Lastly, these estimates of construct reliability were presented with their respective Average Variance Extracted (AVE; Fornell & Larcker, 1981), a measure of the amount of variance that is captured from the items by the construct in relation to the amount of variance due to measurement error. MR and AVE were estimated with the R package semTools (Jorgensen et al., 2018).

All the items from scales were answered in an ordered Likert scale. Given this, we treated the items as ordered categorical instead of continuous: Treating them as continuous would represent a misspecification of the model. We followed the categorical Confirmatory Factor Analysis (CFA) approach that analyzes the data in function of the polychoric correlation between ordered items; this correlation assumes that there is an unobserved underlying variable that accounts for the ordered response (Bovaird & Kozoil, 2012). For the CFA, data were analyzed with the Diagonal Weighted Least Square estimator, with mean and variance adjusted standard errors and chi-square statistic; this approach has been shown to present reliable parameter estimates and model fit without the requirement of extremely large samples (Bovaird & Kozoil, 2012). CFA allowed us to evaluate the

factorial structure of the scales, defining the underlining unobserved constructs. Once the factorial structures were deemed appropriate, we continued to test theoretical relations between the constructs.

The SEM model includes constructs for PT; caregivers' burden, which includes embarrassment/anger (Em), patient's dependency (Pd), and self-criticism (Sc); and a patient's challenging behaviors, which include memory (Mem), depression (Dep), and disruption (Dis). The measurement model follows the structure established by Bekhet and Garnier-Villarreal (2018), which states a theoretically driven structure from the following scales: the PTSS, the 22-item Zarit Burden Interview, and the RMBPC. Since it has been theorized that the relations between these constructs can be explained with mediation (REFS) and moderation (REFS) models, here we evaluated both models and determined which one better described the relation for this sample.

Mediation

The mediation model estimated the direct and indirect effects simultaneously in a comprehensive model. For indirect effects, the Monte Carlo simulation method was used as a resampling method (MacKinnon, Fairchild, & Fritz, 2007; MacKinnon, Lockwood, & Williams, 2004; Preacher & Selig, 2012). The indirect, total, and difference between effects were tested by creating an empirical distribution of them based on the Monte Carlo resamples. These empirical distributions were tested against the null hypothesis value of 0 and the inferences were made in function of the 95% confidence intervals (CI) of the resamples. The model was estimated with 20,000 Monte Carlo samples and estimated with diagonal weighted least squares (DWL). CI were presented to test the null hypothesis.

The model includes three predictors (embarrassment/anger, patient's dependency, and self-criticism), one mediator (PT), and three outcomes (memory, depression, and disruption). The indirect effects are defined as the product of the slopes of the predictors on the mediator (a parameters) and the slope from the mediator on each outcome (b parameters). The direct effects from each predictor is defined as the slope from the predictor on the outcome controlling for the mediator effect (c parameters). Finally, the total effect of each predictor on each outcome is defined by the addition of the indirect effect and the direct effect.

Moderation

The moderation model looked at the effect that PT has on the regressions of each predictor (embarrassment/anger, patient's dependency, and self-criticism) on each outcome (memory, depression, and disruption), identifying if these slopes change depending on their PT score. This was tested by creating new predictors from the interaction of each predictor and the moderator (PT*Em, PT*Pd, PT*Sc). Later, these predictors were added in the regression into each outcome.

Given that these are unobservable constructs, interactions cannot be created by simply multiplying them. Latent interactions are created defining orthogonalized interaction indicators and having these define the respective latent interaction constructs (Lin, Wen, Marsh, & Lin, 2010; Little, Bovaird, & Widaman, 2006; Marsh, Wen, & Hau, 2004).

The worth of the interactions was evaluated by an increase in R2 when the interactions were added for each outcome, and finally when the interaction effects were plotted and probed (Darlington & Hayes, 2017). By estimating the simple slopes—the slopes of interest conditional on specific values of the moderator—we were able to evaluate the effect of the moderator. This allowed us to test the null hypothesis for each simple slope and visualize the change in slope at conditional values of the moderator.

Results

The sample comprised 100 caregivers of persons with dementia. Their age ranged from 18 to 82 years (M = 55, SD = 16.89). Almost three quarters of the sample were females (74%) and almost all were Caucasian (92%).

Approximately 69% of the sample had received a college degree or some college/associated degree. Forty-eight percent reported having an annual income of more than $45,000, while 26% chose “I prefer not to disclose.” Sixty-six percent stated that they were married. Sixty-seven percent of the caregivers reported having good health.

The age of their care-recipients ranged from 50 to 98 years (M= 76, SD = 12). Fifty-nine percent of the patients were females. Years since diagnosis ranged from 6 months to 14 years (M = 5, SD = 3). Sixty percent of the patients with dementia were married and 95% were Caucasian. Regarding the caregiving situation, 25% reported that they were the wives of the care-recipients, another 40% reported that they were the daughters/sons, while the remaining reported being sisters or others. Sixty-nine percent of the sample reported living apart from the care-recipient while 31% of the sample reported living with the patient. Sixty-four percent of the sample reported providing care with daily activities and 36% reported not providing direct care.

A detailed evaluation of the factorial structure can be seen at Bekhet and Garnier-Villarreal (2018). The theoretical measurement CFA presented good fit (X2(969) = 1054.803, p = .028, RMSEA = 0.030 [90% CI = 0.011, 0.042], gamma-hat = 0.963, adjusted gamma-hat = 0.959), showing good absolute fit and indicating that the factorial structure was a good representation of the data. We found that every factor loading was different from 0 ($p < .001$), where the standardized factor loadings ranged from 0.373 to 0.989. Table 1 presents the MR and AVE, showing that the constructs have high reliability.

Table 1. Reliability measures.

Variable	MR	AVE
Embarrassment/anger	0.831	0.370
Patient’s dependency	0.836	0.544
Self-criticism	0.853	0.800
Positive thinking	0.909	0.601
Memory	0.944	0.681
Depression	0.968	0.619
Disruption	0.875	0.471

Note. MR = Maximal Reliability; AVE = Average Variance Extracted.

Mediation

The three predictors Em, Pd, and Sc explained 16.6% of the variance in the mediator PT, while predictors Em, Pd, and Sc, and mediator (PT), explained 6.7% of the variance of memory, 6.8% of the variance of depression, and 16.7% of the variance of disruption. This indicates that the mediation model has low predictive ability for the outcomes of interest.

Table 2 presents the direct and indirect effects from the mediation model. We can see that most of the direct affects are small, standardized effects. For memory and depression, the best predictor is Pd, and for disruption the best predictor is Em. Looking at both direct and indirect effects, we find that none of them is different from 0.

Table 2. Mediation model.

Path	Label	Estimate (SE)	95% CI	Standardized
Direct Effects				
Em → PT	a1	−0.195 (0.475)	−1.127, 0.737	−0.178
Pd → PT	a2	−0.237 (0.464)	−1.146, 0.673	−0.216
Sc → PT	a3	−0.050 (0.159)	−0.362, 0.263	−0.045

PT→ Mem	b1	0.087 (0.146)	−0.199, 0.373	0.092
PT→ Dep	b2	0.011 (0.144)	−0.271, 0.292	0.011
PT→ Dis	b3	0.047 (0.161)	−0.268, 0.363	0.047
Em → Mem	c1	−0.167 (0.505)	−1.157, 0.822	−0.162
Pd → Mem	c2	0.407 (0.485)	−0.544, 1.357	0.393
Sc → Mem	c3	0.045 (0.171)	−0.289, 0.379	0.044
Em → Dep	c4	0.485 (0.539)	−0.572, 1.542	0.468
Pd → Dep	c5	−0.532 (0.517)	−1.544, 0.481	−0.513
Sc → Dep	c6	0.111 (0.169)	−0.220, 0.441	0.107
Em → Dis	c7	0.597 (0.641)	−0.658, 1.853	0.545
Pd → Dis	c8	−0.117 (0.603)	−1.298, 1.064	−0.106
Sc → Dis	c9	−0.073 (0.182)	−0.430, 0.284	−0.067
Indirect Effects				
Em→ PT → Mem	a1*b1	−0.017 (0.054)	−0.131, 0.099	−0.016
Pd→ PT → Mem	a2*b1	−0.021 (0.064)	−0.176, 0.063	−0.020
Sc→ PT → Mem	a3*b1	−0.004 (0.020)	−0.054, 0.022	−0.004
Em→ PT → Dep	a1*b2	−0.002 (0.028)	−0.135, 0.064	−0.002
Pd→ PT → Dep	a2*b2	−0.003 (0.034)	−0.077, 0.123	−0.002
Sc→ PT → Dep	a3*b2	−0.001 (0.007)	−0.035, 0.028	−0.001
Em→ PT → Dis	a1*b3	−0.009 (0.049)	−0.175, 0.062	−0.008
Pd→ PT → Dis	a2*b3	−0.011 (0.041)	−0.114, 0.122	−0.010
Sc→ PT → Dis	a3*b3	−0.002 (0.012)	−0.038, 0.034	−0.002

Note. Estimate = unstandardized regression coefficient; SE = standard error; CI = Confidence Interval; Standardized = standardize regression coefficient; → = direction of the regression; Em = Embarrassment/anger; Pd = Patient's dependency; Sc = Self-criticism; PT = Positive thinking; Mem = Memory; Dep = Depression; Dis = Disruption.

Moderation

We first established a main effects model—where all predictors and the moderator predict all the outcomes—to compare with the moderation model. Table 3 presents the main effects and the moderation models. Table 4 presents the R2 for the main effects and moderation models. In the main effects model, we see that it explained 6.7% of the variance of memory, 6.8% of the variance in depression, and 16.7% of the variance in disruption. None of the main effects were different from 0 ($p > .05$), meaning that the effect of either predictors or moderator cannot be distinguished from 0 conditional on the other predictors in the model, keeping other predictors constant.

Table 3. Moderation model.

Outcome	Main effects (SE, p)	Moderation (SE, p)
Memory		
PT	0.095 (0.160, p = .552)	0.098 (0.160, p = .542)
Em	−0.167 (0.505, p = .740)	−0.174 (0.504, p = .730)
Pd	0.407 (0.485, p = .402)	0.419 (0.485, p = .388)
Sc	0.045 (0.171, p = .791)	0.046 (0.170, p = .785)
PT*Em		−0.216 (0.339, p = .523)

PT*Pd		0.076 (0.224, *p* = .734)
PT*Sc		−0.055 (0.215, *p* = .799)
Depression		
PT	0.012 (0.157, *p* = .941)	0.012 (0.158, *p* = .941)
Em	0.485 (0.539, *p* = .369)	0.498 (0.545, *p* = .361)
Pd	−0.532 (0.517, *p* = .303)	−0.547 (0.521, *p* = .294)
Sc	0.111 (0.169, *p* = .511)	0.114 (0.167, *p* = .498)
PT*Em		0.319 (0.337, *p* = .345)
PT*Pd		−0.188 (0.233, *p* = .420)
PT*Sc		−0.242 (0.195, *p* = .215)
Disruption		
PT	0.052 (0.176, *p* = .768)	0.056 (0.179, *p* = .755)
Em	0.597 (0.641, *p* = .351)	0.622 (0.652, *p* = .340)
Pd	−0.117 (0.603, *p* = .846)	−0.118 (0.612, *p* = .847)
Sc	−0.073 (−.182, *p* = .687)	−0.074 (0.185, *p* = .687)
PT*Em		−0.001 (0.382, *p* = .998)
PT*Pd		−0.047 (0.258, *p* = .857)
PT*Sc		−0.258 (0.238, *p* = .278)

Note SE = standard error, p = p value; Em = Embarrassment/Anger; Pd = Patient's Dependency; Sc = Self-Criticism; PT = Positive Thinking; Mem = Memory; Dep = Depression; Dis = Disruption.

Table 4. R^2 for the main effects and moderation models.

Outcome	Main effects	Moderation
Memory	0.067	0.105
Depression	0.068	0.114
Disruption	0.167	0.232

The moderation model tells us about the benefit of looking at the regression while varying the score of the moderator PT, no longer keeping it constant. We find that the moderation model increased the explained variance 3.8% for memory, 4.6% for depression, and 6.5% for disruption (Table 4). This increase in explained variance led us to think that some of the predictor (Em, Pd, Sc) effects were dependent on PT.

Simple slopes allowed us to test the slopes of interest (e.g., Em → Mem) conditional on different values of the moderator PT, estimating the slopes and testing the significance at each level of PT. Here the moderator was in a standardized scale, meaning that the value of the moderator is in SD scale. We followed the continuous moderator value approach, meaning that we tested the regressions of interest at 61 values of PT, from -3 SD to +3 SD by increments of 0.1. This allowed us to identify at which ranges of PT the regressions change with detail.

Simple slopes are presented in Table 5. We found that some regressions were not different from 0 at any value of PT: EM → Mem, Sc → Mem, Pd → Dis, Sc → Dis. The other five regressions were moderated by PT, as depending on the value of PT the regression value changes and rejects the null hypothesis of being equal to 0.

Table 5. Simple slopes for the three outcomes and their predictors.

Outcome: Memory	
Predictor: Embarrassment	
PT ranges	Em → Mem
−3 to 3	0.47 to −0.82+

Predictor: Dependency	
PT ranges	Pd → Mem
−3 to −0.9	0.19 to 0.35+
−0.8 to 1.3	0.36 to 0.52*
1.4 to 3	0.53 to 0.65+
Predictor: Self-Criticism	
PT ranges	Sc → Mem
−3 to 3	0.21 to −0.12+
Outcome: Depression	
Predictor: Embarrassment	
PT ranges	Em → Dep
−3 to −0.5	−0.46 to 0.34+
−0.4 to 3	0.37 to 1.45*
Predictor: Dependency	
PT ranges	Pd → Dep
−3 to −0.9	0.02 to −0.38+
−0.8 to 3	−0.39 to −1.12*
Predictor: Self-Criticism	
PT ranges	Sc → Dep
−3 to −1.9	0.84 to 0.57+
−1.8 to −1.2	0.55 to 0.40*
−1.1 to 3	0.38 to −0.61+
Outcome: Disruption	
Predictor: Embarrassment	
PT ranges	Em → Dis
−3 to −1.1	0.6243 to 0.6227+
−1.0 to 1	0.6226 to 0.6209*
1.1 to 3	0.6208 to 0.6192+
Predictor: Dependency	
PT ranges	Pd → Dis
−3 to 3	0.02 to −0.23+
Predictor: Self-Criticism	
PT ranges	Sc → Dis
−3 to 3	0.69 to −0.85+

Note. Em = Embarrassment/Anger; Pd = Patient's Dependency; Sc = Self-Criticism;
PT = Positive Thinking; Mem = Memory; Dep = Depression; Dis = Disruption.
*p value <.05.
+p value >.05.

For PD → Mem, as PT increased the slope increased, but was only different from 0 when PT was between −0.8 and 1.3. In the case of Em → Dep, as PT increased the slope passed from negative to positive increasing strength, and this regression was different from 0 when PT was higher than −0.4. For Pd → Dep, as PT increased the slope passed from basically 0 to negative increasing strength; this slope was different from 0 when PT was higher than −0.8. For Sc → Dep, as PT increased the slope decreased in strength, and it was different from 0 when PT ranged from −1.8 to −1.2. Finally, for Em → Dis, as PT increased the slope decreased, and was different from 0 when PT ranged from −1 to 1.1; this slope changed very little at the different values of PT.

Discussion

To date, this is the first study that has investigated the mediating and moderating effects of PT on the relationship between caregivers' burden (embarrassment/anger, patient's dependency, and self-criticism) and their care-recipients' behavioral problems (memory, depression, and disruption). Results indicated that a caregiver's embarrassment, self-criticism, and perception of patient dependency predict depression in the care-recipient, and that these relationships are moderated by PT. Results also indicated that as PT increases, the relationship between embarrassment and disruption goes down as well as does the relationship between self-criticism and depression. The results of this study are similar, in part, to the results of previous research that indicated that PT has been correlated negatively with depressive symptoms in women with diabetes (Zauszniewski, McDonald, Krafcik, & Chung, 2002), and negatively with the burden of caregivers of persons with serious mental illness (Zauszniewski, Bekhet, & Suresky, 2009). More recent research also indicated that optimism was associated with less burden in a sample of 130 caregivers of persons with dementia (Ruisoto, Contador, Fernández-Calvo, Palenzuela, & Ramos, 2019).

The results of this study suggested that enhancing PT in caregivers of persons with dementia would impact the relationship between caregivers' embarrassment and self-criticism and care-recipient's disruptive behaviors and depression. Future longitudinal research studies might consider measuring the impact of PT training interventions on dementia caregivers and on persons with dementia over time. More specifically, the studies could measure the impact of the intervention at 1 week, 6 weeks, and 12 weeks after the intervention to determine the immediate and the lagged effects on caregivers and care-recipients. Also, comparing the PT training intervention delivered in person versus online would be another area of further investigation.

Previous research with other populations showed that PT training intervention has been associated with increasing the spiritual well-being of patients suffering from coronary artery diseases (Ghodsbin, Safaei, Jahanbin, Ostovan, & Keshvarzi, 2015) and reducing the burden of caregivers of persons with autism spectrum disorders (Bekhet, 2017). Therefore, future research might consider measuring the impact of a PT training intervention designed for caregivers at various care-recipients' dementia stages and to plan various levels of preventions for clinical implications. For example, future longitudinal research could address "primary prevention," which aims to prevent disease of injury before it occurs. Such research could investigate the impact of teaching PT strategies for caregivers of newly diagnosed persons with dementia to prevent the development of caregivers' depression and burden. Future research could also address "secondary prevention," which aims to reduce the injury or disease that has already occurred. In this case, secondary prevention could reduce the caregivers' burden and the negative thoughts that have already occurred, and then encourage the use of PT strategies. These PT interventions might include teaching caregivers to highlight the positive aspects of the situation by analyzing it, that is, looking at its positive and negative aspects, and then using those positive aspects for their own advantage. Interrupting pessimistic thoughts through relaxation techniques and distraction can be another helpful PT strategy. Just knowing those PT strategies, however, is not enough. It is essential that caregivers be taught how to practice these strategies (Bekhet & Zauszniewski, 2013).

Limitations of the study include the use of convenience sampling of caregivers, which will limit the generalizability of the findings across dementia caregivers. Another limitation is that the current study is cross-sectional, which does not allow tracking changes in the study variables over time and does not allow stating causality in the relations between factors. For the same reason, the data cannot distinguish if the mediation or the moderation model is the correct one. However, this research will lay the foundation for a future longitudinal research study to assess changes in the study variables over time, such as caregivers' PT and burden as well as the impacts of those variables on their care-recipients' challenging behaviors. Future research might consider comparing caregivers from an early stage program versus a middle stage program, as well as late stage dementia

caregivers in terms of burden and PT. At the same time, longitudinal designs would help to find stronger evidence for either the mediation or the moderation relation between factors.

In brief, the results of this study suggested that PT impacts the strength and/or the association between caregivers' burden and care-recipients' behavioral problems. The results also suggested moving forward with more longitudinal intervention studies to better understand the relationship between dementia caregivers' burden and their care-recipients' behavioral problems. Nurses are in a strategic position to provide caregivers the necessary means to help combat depression and to improve their quality of life and general well-being.

Declaration of Conflicting Interests

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

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The parent study was funded by Delta Gamma Sigma Chapter awarded to Dr. Abir K. Bekhet.

References

Alzheimer's Association . (2019). 2019 Alzheimer's disease facts and figures. Retrieved from https://www.alz.org/media/Documents/alzheimers-facts-and-figures-2019-r.pdf

Baraldi, A. N., Enders, C. K. (2010). An introduction to modern missing data analyses. Journal of School Psychology, 48(1), 5-37. https://doi.org/10.1016/j.jsp.2009.10.001

Bekhet, A. K. (2013). Effects of positive cognitions and resourcefulness on caregiver burden among caregivers of persons with dementia. International Journal of Mental Health Nursing, 22, 340-346. https://doi.org/10.1111/j.1447-0349.2012.00877.x

Bekhet, A. K. (2017). Online positive thinking training intervention for caregivers: Necessity, acceptability, and feasibility. Issues in Mental Health Nursing, 38(5), 443-448. doi:10.1080/01612840.2017.1279247

Bekhet, A. K., Garnier-Villarreal, M. (2018). Factor structure and psychometric properties of cognitive-behavioral scales in caregivers of persons with dementia. International Journal of Psychology and Psychoanalysis, 4(2), 1-9. doi:10.23937/2572-4037.1510035

Bekhet, A. K., Zauszniewski, J. A. (2013). Measuring use of positive thinking skills scale: Psychometric testing of a new scale. Western Journal of Nursing Research, 35, 1074-1093. https://doi.org/10.1177%2F0193945913482191

Bovaird, J. A., Kozoil, N. A. (2012). Measurement models for ordered-categorical indicators. In Hoyle, R. H. (Ed.), Handbook of structural equation modeling (pp. 495-511). New York, NY: Guilford Press.

Coon, D. W., Rubert, M., Solano, N., Mausbach, B., Kraemer, H., Arguëlles, T., . . . Gallagher-Thompson, D. (2004). Well-being, appraisal, and coping in Latina and Caucasian female dementia caregivers: Findings from the REACH study. Aging & Mental Health, 8(4), 330-345.

Darlington, R. B., Hayes, A. F. (2017). Regression analysis and linear models: Concepts, applications, and implementation. New York, NY: Guilford Press.

Dekker, R. L., Peden, A. R., Lennie, T. A., Schooler, M. P., Moser, D. K. (2009). Living with depressive symptoms: Patients with heart failure. American Journal of Critical Care, 18, 310-318. doi:10.4037/ajcc2009672

Enders, C. K. (2010). Applied missing data analysis. New York, NY: Guilford Press.

Faul, F., Erdfelder, E., Lang, A.-G., Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods, 39, 175-191.

Fornell, C., Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement errors. Journal of Marketing Research, 18(1), 39-50. https://www.jstor.org/citation/info/10.2307/3151312

Ghodsbin, F., Safaei, M., Jahanbin, I., Ostovan, M. A., Keshvarzi, S. (2015). The effect of positive thinking training on the level of spiritual well-being among the patients with coronary artery diseases referred to Imam Reza specialty and subspecialty clinic in Shiraz, Iran: A randomized controlled clinical trial. ARYA Atherosclerosis, 11(6), 341-348. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4738044/

Greene, R. (2008). Human behavior theory and social work practice (3rd ed.). New Brunswick, NJ: Transaction Publishers.

Jorgensen, T. D., Pornprasertmanit, S., Schoemann, A. M., Rosseel, Y. (2018). semTools: Useful tools for structural equation modeling. R package version 0.5-1. Retrieved from https://CRAN.R-project.org/package=semTools

Kline, R. B. (2015). Principles and practice of structural equation modeling (4th ed.). New York, NY: Guilford Press.

Li, H. (1997). A unifying expression for the maximal reliability of a linear composite. Psychometrika, 62, 245−249.

Lightsey, R. O., Boyraz, G. (2011). Do positive thinking and meaning mediate the positive affect−life satisfaction relationship? Canadian Journal of Behavioral Science, 43(3), 203-213. https://psycnet.apa.org/doi/10.1037/a0023150

Lin, G. C., Wen, Z., Marsh, H. W., Lin, H. S. (2010). Structural equation models of latent interactions: Clarification of orthogonalizing and double-mean-centering strategies. Structural Equation Modeling, 17(3), 374-391. doi:10.1080/10705511.2010.488999

Little, T. D. (2013). Longitudinal structural equation modeling. New York, NY: Guilford Press.

Little, T. D., Bovaird, J. A., Widaman, K. F. (2006). On the merits of orthogonalizing powered and product terms: Implications for modeling interactions among latent variables. Structural Equation Modeling, 13(4), 497-519. https://doi.org/10.1207/s15328007sem1304_1

Luthar, S. S., Cicchetti, D., Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. Child Development, 71(3), 543-562.

MacKinnon, D. P., Fairchild, A. J., Fritz, M. S. (2007). Mediation analysis. Annual Review of Psychology, 58, 593-614. https://doi.org/10.1146/annurev.psych.58.110405.085542

MacKinnon, D. P., Lockwood, C. M., Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. Multivariate Behavioral Research, 39(1), 99-128. https://doi.org/10.1207/s15327906mbr3901_4

Marsh, H. W., Wen, Z., Hau, K. T. (2004). Structural equation models of latent interactions: Evaluation of alternative estimation strategies and indicator construction. Psychological Methods, 9(3), 275-300. doi:10.1037/1082-989X.9.3.275

McArdle, J. J., Nesselroade, J. R. (2014). Longitudinal data analysis using structural equation models. Washington, DC: American Psychological Association.

Musil, C. M., Haug, M. R., Warner, C. D. (1988). Stress, health, and depressive symptoms in older adults at three time points over 18 months. Issues in Mental Health Nursing, 19, 207-224.

Naseem, Z., Khalid, R. (2010). Positive thinking and coping with stress and health outcomes: Literature review. Journal of Research & Reflections in Education, 4, 42-61.

Papastavrou, E., Kalokerinou, A., Papacostas, S.S., Tsangari, H., Sourtzi, P. (2007). Caring for a relative with dementia: Family caregiver burden. Journal of Advanced Nursing, 58(5), 446-457. https://doi.org/10.1111/j.1365-2648.2007.04250.x

Preacher, K. J., Selig, J. P. (2012). Advantages of Monte Carlo confidence intervals for indirect effects. Communication Methods and Measures, 6(2), 77-98. doi:10.1080/19312458.2012.679848

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing: Vienna, Austria. Available at https://www.R-project.org/

Raykov, T. (2012). Scale construction and development using structural equation modeling. In Hoyle, R. H. (Ed.), Handbook of structural equation modeling (pp. 472-494). New York, NY: Guilford Press.

Rocca, W. A., Petersen, R. C., Knopman, D. S., Hebert, L. E., Evans, D. A., Hall, K. S., . . . White, L. R. (2011). Trends in the incidence and prevalence of Alzheimer's disease, dementia and cognitive impairment in the

United States. Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 7(1), 80-93. https://dx.doi.org/10.1016%2Fj.jalz.2010.11.002

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. Journal of Statistical Software, 48(2), 1-36. http://dx.doi.org/10.18637/jss.v048.i02

Ruisoto, P., Contador, I., Fernández-Calvo, B., Palenzuela, D., Ramos, F. (2019). Exploring the association between optimism and quality of life among informal caregivers of persons with dementia. International Psychogeriatrics, 31(3), 309-315. https://doi.org/10.1017/S104161021800090X

Sharma, N., Chakrabarti, S., Grover, S. (2016). Gender differences in caregiving among family—Caregivers of people with mental illnesses. World Journal of Psychiatry, 6(1), 7-17. https://doi.org/10.5498/wjp.v6.i1.7

Teri, L., Truax, P., Logsdon, R., Uomoto, J., Zarit, S., Vitaliano, P. P. (1992). Assessment of behavioral problems in dementia: The revised memory and behavior problems checklist. Psychology and Aging, 7(4), 622-631.

Tod, A., Warnock, C., Allmark, P. (2011). A critique of positive thinking for patients with cancer. Nursing Standard, 25, 43-47. https://doi.org/10.7748/ns2011.06.25.39.43.c8544

van Buuren, S . (2012). Flexible imputation of missing data. Boca Raton, FL: CRC Press.

van Buuren, S., Groothuis-Oudshoorn, K. (2011). mice: Multivariate imputation by chained equations. Journal of Statistical Software, 45(3), 1-67. http://dx.doi.org/10.18637/jss.v045.i03

VanBreda, A. D. (2001). Resilience theory: A literature review. Pretoria, South Africa: South African Military Health Service, Military Psychological Institute. Retrieved from http://www.vanbreda.org/adrian/resilience/resilience_theory_review.pdf

Zarit, S. H., Reever, K. E., Bach-Peterson, J. (1980). Relatives of the impaired elderly: Correlates of feelings of burden. Gerontologist, 20(6), 649-655.

Zauszniewski, J. A., Bekhet, A. K., Suresky, M. J. (2009). Effects on resilience of women family caregivers of adults with serious mental illness: The role of positive cognitions. Archives of Psychiatric Nursing, 23(6), 412-422. https://doi.org/10.1016/j.apnu.2008.12.004

Zauszniewski, J. A., McDonald, P. E., Krafcik, K., Chung, C. (2002). Acceptance, cognitions, and resourcefulness in women with diabetes. Western Journal of Nursing Research, 24, 728-743. https://doi.org/10.1177/019394502762476951