

## **A Causal Model of Caregiving Burden among Dementia Caregivers**

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*Received: 25 November 2017, Revised: 14 August 2018, Accepted: 25 September 2018*

### **Abstract**

In this study, a cross-sectional, predictive correlation design was used to identify and test a causal relationship between behavior disturbances, coping, family conflict, self-esteem and social support to caregiver burden among dementia caregivers. A total of 450 caregivers of dementia aged over 18 years were recruited from 4 hospitals in northern Thailand based on selected criteria. Demographic Questionnaire, Behavioral Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD), The Family Conflict Scale, The Zarit Burden Interview Scale, The Perceived Social Support Questionnaire, The Brief COPE and The Rosenberg Self-Esteem with acceptable reliability coefficients were used to collect data. Data were analyzed using descriptive statistics, Pearson's Product-Moment Correlation and path analysis by structural equation modeling.

Results showed that the modified model fitted with the data and explained 58 % of the variance in caregiving burden among dementia caregivers. Coping and family conflict had a positive direct effect on caregiving burden ( $p < 0.001$ ), whereas self-esteem and social support had a direct negative effect on caregiving burden ( $p < 0.001$ ). Behavior disturbance had a positive indirect effect caregiving burden ( $p < 0.001$ ) via family conflict. Coping had a positive indirect effect on caregiving burden ( $p < 0.001$ ) via behavior disturbance and family conflict. Social support had a negative indirect effect on caregiving burden ( $p < 0.001$ ) via family conflict and self-esteem. The results of this study could be used as a guideline for psychiatric nurses in planning an appropriate intervention program to reduce burden of caregivers of dementia patients in Thailand.

**Keywords:** Caregiving burden, Dementia caregivers, Causal model

### **Introduction**

According to the World Alzheimer Report, there were 36 million people with dementia at the present time. Dementia populations are rapidly increasing in almost every country worldwide. It is predicted that the numbers will double every 20 years, to 66 million in 2030, and 115.4 million in 2050 [1]. The total number of new cases of dementia each year worldwide is nearly 7.7 million, implying 1 new case every 4 seconds. Based on studies in developed countries, the overall prevalence for males and females doubles every 5 years and increases in age after the age of 65. It is largely a disease of older people, but 2 % of those affected are under 65 years of age [2]. In Thailand, there are also larger numbers of dementia patients. There were 270,000 dementia patients in 2013 [3]. The estimated number of people living with dementia in 2015 was about 600,000, and the numbers will rise to 1,117,000 and 2,017,000 in 2030 and 2050 respectively [4]. The prevalence of dementia is 1.8 - 10.2 % in the age group of 55 years and above [5]. Health Systems Research Institute of Thailand surveyed 21,960 people with people aged over 60 years in 2008 - 2009. The findings showed that 12.4 % of people aged over 60 years had dementia and 9.8 % were male while 15.1 % were female [6].

Dementia is a serious public health problem, associated with complex needs and, especially in the later stages, high levels of dependency and morbidity. Care needs are typically provided by long-term home caregivers. Caring for dementia patients involves many impacts on caregivers, including psychological, physical health and economic impacts [7]. Psychological impact includes exceptional proneness to affective disorders such as major depression, anxiety disorder and increased emotional stress and physical health impact. Family caregivers of people with dementia experience greater risk of chronic diseases, physiological impairments, increased health care utilization and mortality than those who are not caregivers. Thirty-eight percent of caregivers of people with dementia reported that the physical impact of caregiving was high to very high [8]. Economic impact occurs in caregivers spending 3.6 h per day on average assisting with activities of daily living (basic ADL, IADL care inputs). In addition to this, dementia patient caregivers are more likely to lose income due to disruptions in employment, and taking many less demanding jobs in order to provide care [9].

According to the Alzheimer's Association, over half of caregivers have rated their stress associated with providing care as high or very high. Similarly, the other dementia studies found that caregivers of persons with dementia experienced high levels of burden [10]. George and Gwyther stated that caregiver burden was the stress experienced by friends and family members caring for someone with Alzheimer (AD). This stress negatively impacts emotional or psychological, physical, financial and social functioning [11]. Burden has also been described in terms of the impact of the cognitive and behavioral changes of the caregiver. Caregivers providing assistance to older adults with AD who suffer from behavioral disturbances and those who require help with one or more activities of daily living (ADL) are more likely to report experiencing burden [12]. The burden of caregiving is important because the course of AD may last from 1 to 20 years with an average 8 years of symptoms [13]; thus, caregiving duties may continue for a prolonged time. Caregivers who are advanced in age, women and co-residents experience greater burden than young, male caregivers and those who live apart from the care-recipient [14]. Several studies have reported that spousal caregivers experience the highest level of burden [15]. In Thailand, according to literature review, there were still a few studies testing a causal model of caregiving burden among dementia caregivers. Therefore, knowledge of factors influencing caregiving burden is still inadequate. Even though there were experimental study interventions for decreasing burden of the caregivers in Thailand, these interventions focused on some selected variables. It is, thus, obvious that the knowledge of other factors influencing caregiving burden is needed. Behavior disturbance is behavior of dementia patients that it is behavioral and psychological symptoms of dementia (BPSD). Caregivers providing support for personal care, dealing with high levels of behavior problems and experiencing burden, often report more physical symptoms and poorer health [17]. Family conflict is one factor of secondary stressors, it is defined as overt disagreement between the participants and any family member to whom she/he was related through birth, marriage, or adoption [18]. Family conflict can directly impact caregiver stress. [16]. Self-esteem refers most generally to an individual's overall positive evaluation of the self [19]. Self-esteem is one of the variables related to adaptation and well-being of caregivers. Specifically, high self-esteem is associated with better psychological health by reducing levels of anxiety, depression and burden [20]. Coping as a constant modulation of cognitive and behavioral effort in order to manage specific demands that exceed an individual's resources. Higher scores on the burden scale were found to be associated with use of emotion-focused coping strategies, while less burdened relatives used more problem-solving approaches to care-giving demands [10]. Social support was a factor of burden associated with caregiving with dementia [21]. Caregivers who have more frequent contacts with family and friends tend to have lower levels of burden than caregivers with less frequent contacts with their social support network [22]. In this study, the researcher aimed to test a model of burden on the caregiving of patients with dementia developed based on the Stress Process Model [15]. According to the stress process model, burden of caregivers is on domain of this model among dementia patients. The four domains make up this process, each comprising multiple components. The domains are the background and context, stressors, mediators and outcomes [16]. In the stress process model, background and context include age, gender, ethnicity, education, occupational and economic. Stressors include cognitive status, problematic behavior, family conflict economic problem, self-esteem and role captivity. Mediators include coping and social support and outcome include caregiving burden [16]. The results from this

study will be useful for psychiatric nurses in planning an appropriate intervention program to reduce caregivers' burden in Thailand. The objective of this study is to test the causal model of caregiving burden among caregivers of patients with dementia, which illustrates the causal relationship between coping, self-esteem, family conflict, social support, and behavior disturbance and caregiving burden among caregivers of patients with dementia. The hypotheses derived from the hypothesized model are:

1. Behavior disturbance, family conflict and coping have a positive direct effect on caregiving burden.
2. Self-esteem and social support have a negative direct effect on caregiving burden.
3. Behavior disturbance has a direct effect on caregiving burden via self-esteem and family conflict.
4. Family conflict has a direct effect on caregiving burden via self-esteem.
5. Coping has an indirect effect on caregiving burden via behavior disturbance, self-esteem and family conflict.
6. Social support has a negative direct effect on caregiving burden and also indirect effect on caregiving burden via behavior disturbance, self-esteem and family conflict.

### Materials and methods

This study employed a cross-sectional, predictive correlation design aimed to test a causal model of caregiving burden among caregivers of patients with dementia. The target population were male and female adults who were family caregivers of persons with dementia who attend the outpatient (OPD) unit of a hospital in the North Region of Thailand. The samples of this study were selected from the family caregivers of adult persons who have been diagnosed with dementia, and are current or former patients at the Somdejphrajaotaksin Maharaj Hospital in Tak Province, Sukhothai Hospital in Sukhothai Province, Majam Hospital in Chiang Mai Province, Sansai Hospital in Chiang Mai Province and Suanprung Psychiatric Hospital in Chiang Mai Province. The sample was selected by using purposive sampling method based on the inclusion criteria for this study as follows:

- (1) aged 18 years or over,
- (2) be the family caregivers for persons with dementia at home and have provided care for at least six months (spouse, child, parent, or sibling),
- (3) care for a patient without payment,
- (4) able to understand and communicate with others in Thai language,
- (5) be willing to participate in this study.

The estimated sample size in this study was based on Schreiber, Stage, King, Nora, and Barlow. Schreiber and colleagues in 2006 [23] suggested that the sample size requirement of model testing was impacted by 5 considerations, namely multivariate distribution, estimation technique, model complexity, amount of missing data and amount of average error variance among the reflective indicators. The generally accepted ratio to minimize problems with deviations from normality is 10 respondents per each estimated parameter in the model [23]. Based on this suggestion, a ratio of 10 respondents per each estimated parameter is calculated as 410 based on 41 estimated parameters. In addition, sample size should be increased by more than 10 percent in order to prevent missing data [24]. The participants in this study were recruited at the same time from five hospitals (Somdejphrajaotaksin Hospital, Sukhothai Hospital, Majam Hospital, Sansai Hospital and Suanprung Psychiatric Hospital) from July 2015 to January 2016 until the number reached 450 cases. Purposive sampling method was used to obtain the required sample who had met the inclusion criteria from the name of registered dementia patients who were listed in the database of each hospital in five hospitals. However, the number of those participants from each hospital was not specified. The sample recruitment depended on the chances of each patient who came to utilize the service at out-patients department from those five hospitals. Therefore, a sample of 450 family caregivers of adult persons who have been diagnosed with dementia was recruited for this study.

Research instruments and validity test:

1. The Demographic Data Tool was developed by the researcher and used to obtain data, including the patient's age, duration of illness, severity of dementia, occupational status, number of psychiatric hospital admissions, caregiver's age, marital status, education level, religion, caregiving hours, relations with care recipient, and financial status. These data were used to describe the sample.

2. The Zarit Burden Interview was developed by Zarit, Reever and Bach-Peterson [22] and translated into Thai by Pankong [25]. These measures were used to assess the level of burden experienced by the principle caregivers of older persons with senile dementia and disabled persons. It measures burden, guilty and embarrassment and consisted of 22 items. The items use a 5-point Likert scale with responses from 0 (never) to 4 (nearly always). The sum of all responses generates total burden score indicating higher scores are of greater caregiving burden. Total scores range from 0 (low burden) to 88 (high burden). Regarding interpretation of score, 0 - 21 means little or no burden, 21- 40 means mild to moderate burden, 41 - 60 means moderate to severe burden, and 61 - 88 means severe burden. In this study, the internal consistency reliability of this instrument was tested with 10 caregivers of persons with dementia. The Cronbach's alpha coefficient in this pilot study was 0.87.

3. The Brief COPE Inventory was developed by Carver, Scheier, and Weintraub [26] and translated into Thai by Kritpracha [27]. These measures assess both approach and avoidance coping responses and both problem and emotion-focused strategies. The Brief COPE Inventory measures 14 theoretically identified coping responses: Self-distraction, Active coping, Denial, Substance use, Use of emotional support, Use of instrumental support, Behavioral disengagement, Venting, Positive reframing, Planning, Humor, Acceptance, Religion, and Self-blame. It represents a way to rapidly measure coping responses because it is a short 28-item self-report questionnaire with two items for each of the measured coping strategies. The items use a 4-point Likert scale, ranging from '1 = not at all' to '4 = a lot' to measure how much participants have used each coping strategy to cope with a situation. The sum score for the Brief COPE Inventory varies from 28 to 112. Score 28 through 56 means low stress, score 57 through 84 means medium stress and score 85 through 112 means high stress. In this study, the internal consistency reliability of this instrument was tested with 10 caregivers of persons with dementia. The Cronbach's alpha coefficient in this pilot study was 0.88.

4. The Rosenberg Self-Esteem Scale was developed by Rosenberg [12] and translated into Thai by Srimorakot [28]. This measure consists of 10 items with 4 possible responses on a 4-point scale format ranging from strongly agree to strongly disagree (1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree). The scale ranges from 0 - 30. Scores between 15 and 25 are within normal range while scores below 15 suggest low self-esteem. The sum score for self-esteem varies from 10 to 40. Higher sum score indicates higher self-esteem. Lower sum score indicates lower self-esteem. In this study, the internal consistency reliability of this instrument was tested with 10 caregivers of persons with dementia. The Cronbach's alpha coefficient in this pilot study was 0.87.

5. The Family Conflict Scales was developed by Semple and colleagues [29] and translated into Thai by the researcher. This measure consists of 12 items. The items use a 4-point Likert scale, ranging from 1 (no disagreement) to 4 (quite a bit of disagreement). Caregivers are asked to indicate how much conflict they have had with anyone in their families in the past year due to certain reasons (e.g., they don't accept you for who you are; they are critical of your lifestyle). Response categories range from 1 (no disagreement/ none at all); 2 (just a little disagreement); 3 (some disagreement); and 4 (quite a bit of disagreement/ very much). Mean scores are used in these analyses. Higher scores are indicative of greater conflict. In this study, the internal consistency reliability of this instrument was tested with 10 caregivers of persons with dementia. The Cronbach's alpha coefficient in this the pilot study was 0.82.

6. The Social Support Questionnaire was developed by Schaefer, Coyne and Lazarus [30] and translated into Thai by Pipatananond [31]. It measures tangible, informational, and emotional support. The Social Support Questionnaire consists of three aspects of social support evaluation which include information (1 item), emotional (4 items) and tangible (2 items). The quantity of help is asked from five resources as 1) family (spouses, parents, and children; 2) siblings and relatives; 3) friends, coworkers, and neighbors; 4) other providers in community such as traditional doctors; and 5) healthcare providers. The rating scale has 5 levels starting from 0 (never giving help) to level 4 (give most help). Each social

support resource consists of the same 7 questions. To score the SSQ, participants are asked to rate each of the lists of 5 resources of social support. The total score is obtained by summing the numerical value of the responses in all resources. A total score from all sources of social support is obtained by summing across all items, with a possible score range of 0 - 140. A higher score means caregivers perceive a higher level of social support. In this study, the internal consistency reliability of this instrument was tested with 10 caregivers of persons with dementia. The Cronbach's alpha coefficient in this pilot study was 0.92.

7. Behavioral Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD) was developed by Reisberg [32] and translated into Thai by Thavichachart [33]. This tool consists of 26 items in which the family member or caregiver provides information about the level of severity of patient's behaviors for each question over the past 2 weeks. The items use a 4-point Likert scale. Each item is scaled from 0 (= not present) to 3 (= most severe). The scores of the items are summed over rated behaviors to yield subscale scores for delusions, hallucinations, agitation, aggressive behavior, depressiveness and anxiety. Higher score present worse symptoms of dementia. In this study, the internal consistency reliability of this instrument was tested with 10 caregivers of persons with dementia. The Cronbach's alpha coefficient in this pilot study was 0.92.

### Data collection

Data collection was conducted after receiving approval from the Research Ethics Committee, Faculty of Nursing, Chiang Mai University, and from the Research Ethics Committee of Somdejphrajataksin Hospital, Sukhothai Hospital, Majam Hospital, Sansai Hospital and Suanprung Psychiatric Hospital. Data collection took place from June 2015 to January 2016. The processes of collecting data are described as follows:

1. The researcher visited the five selected hospitals and gave important information such as the purpose of the study, its benefits and the data collection procedure to the directors of hospitals, the head nurses, and their health care team who worked in dementia clinic.

2. Data were collected by the researcher and five research assistants. The research assistants chosen were registered nurses working at out-patient ward who had been involved in caring for dementia patients and caregivers who participated in this study. They were the persons who selected participants for joining this study. Nurses were a person who recruit the caregivers who take care of those patients at home. All of research assistants were trained to collect the data from research team prior to data collection. They were trained in order to have better understanding regarding the objects of the study, the inclusion criteria of the potential participants, the data collection procedure, the participants' human rights, and their role as research assistants. The researcher observed the research assistants closely during the first time of data collection and gave recommendations until they clearly understood the data collection procedure. During the data collection, the researcher phoned the research assistants every two weeks to assess the quality of the data collection. The researcher and the research assistants recruited caregivers who meet the inclusion criteria from Out Patient Department of the hospitals. We reviewed the medical records of dementia patients in order to select potential subjects who met the inclusion criteria. Then, the researcher recorded the names of the eligible subjects in a list.

3. The researcher and the research assistants informed the participants about the purpose, the benefits, and the subject's rights to refuse or discontinue participation in this study without any effects on them based on the principle of human rights protection. When those subjects agreed to participate in the study, they signed a consent form for protection of human subjects. In this study, if the participants did not answer some questions, they could answer privately at their homes when the research team paid a visit. We visited 1 time per participants did not answer in this study.

4. The researcher and the research assistants explained to the participants how to answer the questionnaires. The researcher and the research assistants emphasized to all of the participants that they should answer all of the questions in the questionnaires and let the participants answer the questions by themselves.

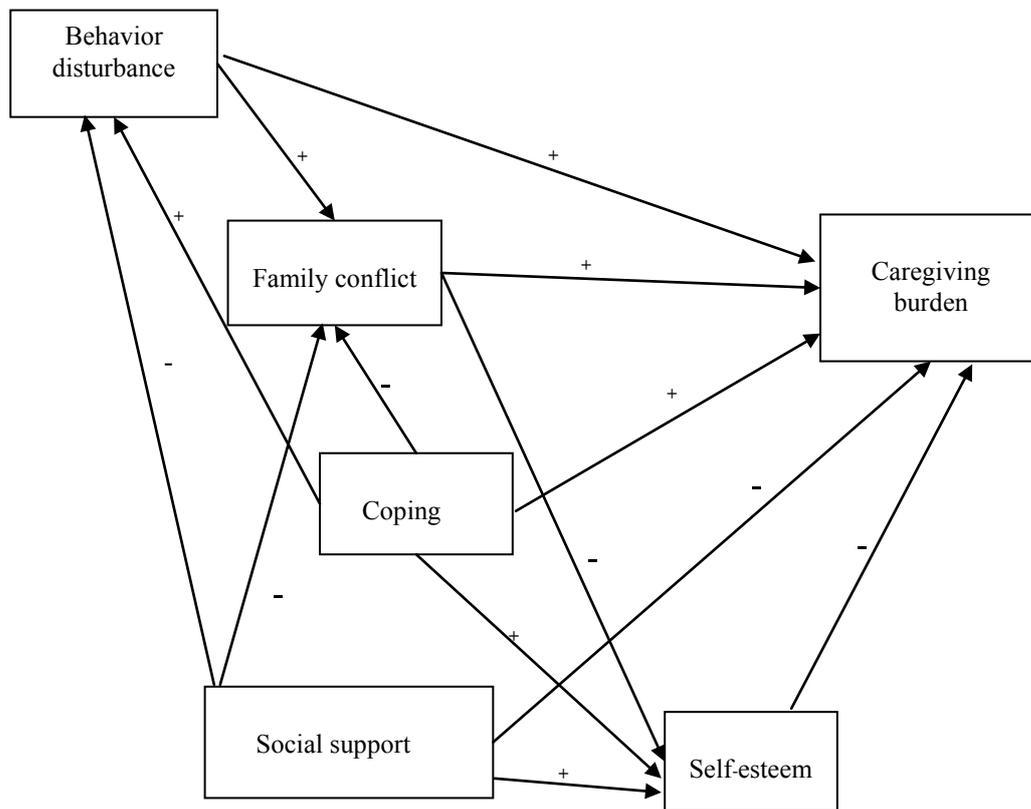
5. The participants completed all questionnaires as sequenced by researcher: 1) The Demographic Data Tool, 2) Behavioral Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD), 3) The Family Conflict Scale, 4) The Zarit Burden Interview Scale, 5) The Perceived Social Support Questionnaire, 6)

The Brief COPE, and 7). The Rosenberg Self-Esteem. The approximate time used per person was 45 - 60 min and subjects could take a break for 5 - 10 min. First, caregivers completed questionnaires following the sequence, which were the Demographic Data Tool, Behavioral Pathology in Alzheimer's disease Rating Scale (BEHAVE-AD) and The Family Conflict Scale. Later, after a break for 5 - 10 min, caregivers started again to complete the questionnaires following the sequence as The Zarit Burden Interview, The Social Support Questionnaire, The Brief COPE, and The Rosenberg Self-Esteem Scale.

6. After the researcher and the research assistants received 450 questionnaires, they checked all the questionnaires for the completeness. If there were missing data, the researcher and the research assistants would ask the subjects to fill in and complete the questionnaires based on patients. In addition, the completed questionnaires were sealed in envelopes to maintain confidentiality. The participants were thanked for their participation.

7. Finally, all 450 questionnaires were completed, and the data were entered in computer and organized for data analysis.

**Ethical Considerations:** The study was approved by The Research Ethics Committee of Faculty of Nursing, Chiang Mai University (No.004/2015). The principle ethical considerations including the nature and processes of the study, anonymity and confidentiality issues, voluntary involvement, and the right to withdraw at any time without repercussions, were given to inform all eligible subjects. When the subjects agreed to participate, they were asked to sign a consent form.



**Figure 1** Hypothesized model of factors influencing caregiving burden among dementia caregivers.

### Data analysis

The relationship among all variables were analyzed by Pearson's Product-Moment Correlation and the relationship between 5 factors and caregiving burden was tested by structural equation modeling using Analysis of Moment Structures (AMOS) to confirm the hypothesized causal model of caregiving burden among dementia caregivers.

## Results and discussion

### Results

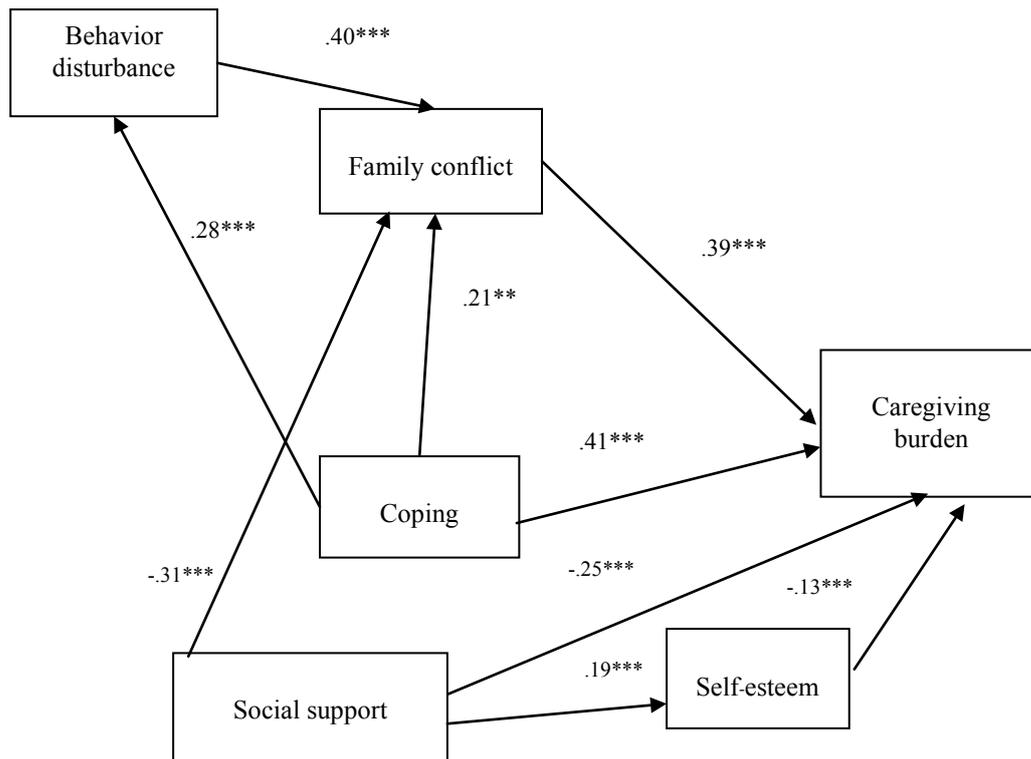
The participants in this study consisted of 107 men (23.78 %) and 343 women (76.22 %). The age of the participants ranged from 20 to 87 years with a mean of 50.07 (SD = 11.94). Caregivers who are advanced in age experience greater burden than young [15]. The largest numbers of the participants were agriculturists (26.22 %). Of those who were workers (19.78 %) and had weaving occupation (16.67 %), approximately 69 % of them were married and 20.66 % were single. Most of the participants had completed primary school (40.89 %) and 1.78 % had no formal education. Regarding the personal income of the samples, the largest number of them had income of more than 10,000 baht per month (44.67 %). Fifty-four percent of the samples were children who had relationship with patients. The severity of dementia of the participants in this study ranges from mild (248 or 55.11 %) to moderate (124 or 27.56 %) and severe (78 or 17.33 %). The age of the patients of dementia ranged from 43 to 96 years, with a mean of 78.07 (SD = 11.84). This finds similarity other researches that caregivers who are women [9] and co-residents experience greater burden than male caregivers and those who live apart from the care-recipient [7]. Several studies have reported that spousal caregivers experienced the highest level of burden [14,15].

After the hypothesized model was tested, all the fit indices showed that the hypothesized model did not fit the actual data. Therefore, modification of the model was performed based on both reasonability of statistical findings and theoretical knowledge until it fit the data well. The modification of the model was performed three times by deleting the five pathways from behavior disturbance to caregiving burden and self-esteem, social support to behavior disturbance and coping to self-esteem, from self-esteem to adherence to family conflict. The coefficients of these pathways were not significant and some paths were negative in direction of relationship. After the final model modification, all coefficients of pathways were statistically significant and showed the improvement of the model that fit with the empirical data (**Figure 2**). Results of effects, including direct, indirect and total effects of caregiving burden are presented in **Table 1**.

**Table 1** Structural Path Coefficients of the Final Model of Caregiver burden (N = 450).

Causal variables	Affected variables														
	Coping			Social support			Behavioral disturbance			Family conflict			Self esteem		
	TE	IE	DE	TE	IE	DE	TE	IE	DE	TE	ID	DE	TE	ID	DE
Coping	-	-	-	-	-	-	0.50	0.22	0.28***	0.33***	0.11	0.21	0.08	-0.02	0.10
Social support	-	-	-	-	-	-	-0.07	-0.05	-0.01	-0.34	-0.03	-0.31***	0.20***	0.01	0.09***
Behavioral disturbance	0.50	0.22	0.28***	-0.07***	-0.05	0.01***	-	-	0.01	0.4***	-	0.4***	-0.06	-0.01	-0.05
Family conflict	0.33**	0.11**	0.21**	-0.33	-0.03	-0.31***	0.04***	-	0.4***	-	-	-	-0.21	-	-0.21
Self-esteem	0.08	-0.02	0.10	0.20***	0.01	0.19***	-0.06***	-0.01	-0.05***	-0.02***	-	-0.02***	-	-	-
Caregiver burden	0.53***	0.12	0.41***	-0.4***	-0.16	-0.25***	0.16	0.16***	-	-0.39***	-	0.39***	-0.13***	-	-0.13***

Note. TE = Total effect, IE = Indirect effect, DE = Direct effect, \*\*\* $p < 0.001$



**Figure 2** Final modified model of the causal model of caregiving burden among dementia caregivers.

Chi-square ( $\chi^2$ ) = 62.72,  $df = 37$ ,  $p = 0.005$ , RMSEA = 0.04, GFI = .98, AGFI = .95, CFI = .99, SRMR = 0.021 \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

### Discussion

The causal model of caregiving burden among dementia showed the best fit with the empirical data ( $R^2 = 62.72$ ,  $df = 37$ ,  $p = .005$ , RMSEA = 0.04, GFI = .98, AGFI = .95, CFI = .99, SRMR = 0.021). The model explained 58 % of the total variance in caregiver burden. Coping and family conflict had a positive direct effect on caregiver burden ( $p < 0.001$ ), whereas self-esteem and social support had a direct negative effect on caregiver burden ( $p < 0.001$ ). Behavior disturbance had a positive indirect effect on caregiver burden ( $p < 0.001$ ) via family conflict. Coping had a positive indirect effect on caregiver burden ( $p < 0.001$ ) via behavior disturbance and family conflict. Social support had a negative indirect effect on burden ( $p < 0.001$ ) via family conflict and self-esteem.

From this study, behavior disturbances had no direct effect but a positive indirect effect on caregiver burden. As the symptoms of behavioral and psychological symptoms of dementia (BPSD) in patients had less and no effect on the caregiver burden, family caregivers were able to handle stressful situation. Few previous studies conducted a causal model of caregiving burden among dementia caregivers, but there were studies similar to this study that conducted a causal model of caregiving burden in other groups (e.g., caregivers for the schizophrenia, parents of chronically ill children) that could explain 64 and 57 % of the model respectively. Furthermore, the predictors of caregiver burden in caregivers of individuals with dementia [34] could explain 16 % of predictors of caregiver burden and this study used conceptual framework of Stress Process Model developed by Pearlin and colleagues [16] that explained about factors related to caregiver burden such as socio-demographical factors, caregiving-related factors, coping.

The finding of this study showed that 58 % of the total variance in caregiving burden was explained by the 5 predictors. The possible reason could be that the effects of the combination of the other causal variables which resulted in moderate strength of the structural pathways may not be examined, including no modified variables and modified variables which are managed by other health care providers which do not depend only on the nursing role. As regards 5 variables affecting caregiving burden in this study, these factors can be divided into three groups based on the Stress Process Model [16], including Primary stressors, Secondary stressors and Mediators/Resources. In this study, Primary stressors can be behavior disturbance. Secondary stressors can be family conflict and self-esteem. Mediators/Resources can be social support. The five factors affecting caregiving burden among dementia caregivers are included into the hypothesized causal model including coping, self-esteem, family conflict, social support and behavior disturbance. These factors are derived from the stress process model [16]. All significant factors affecting burden [16]. The hypotheses are relationship between the exogenous variable (disturbance, family conflict, self-esteem), the mediating variable (coping, social support), and the endogenous variable (caregiving burden). The discussion order will follow the final model in which variables are from the left (exogenous variable) to the right (endogenous variable). The arrangement presentation is also consistent with the sequence of the 6 proposed research hypotheses.

Regarding the effects of behavior disturbance on caregiving burden, as hypothesized, behavior disturbance positively influenced caregiving burden. The result was consistent with the study of Arai and colleagues [35] reporting that the burden of caring for a person with dementia was associated with behavioral disturbances. In addition, the main results also indicated that behavior disturbance was positively correlated with caregiver burden ( $r = 0.49$ ,  $P < 0.001$ ) [36], and that behavior disturbance was a predictor of burden among dementia caregivers ( $\beta = 0.20$ ,  $P < 0.01$ ) [37]. Similarly, some reports have indicated that the behavioral and psychological symptoms of dementia (BPSD) are associated with increased burden of care ( $r = 0.57$ ; 95 % CI = 0.52 to 0.62) [38]. In this study, when the hypothesized model was tested, the final model showed that behavior disturbance had no direct effect on caregiving burden, but it had a positive indirect effect on caregiving burden ( $\beta = 0.16$ ,  $p < 0.001$ ). This result is similar to that of the study by Linde and colleagues [39]. The result showed the no correlation to caregiver burden. This means that caregivers' misunderstanding about behavior reflected the perception that the relative had transgressed social norms and this is associated with the caregiver's personal or sociocultural expectations [40].

Concerning the effects of family conflict on caregiving burden, the finding in the current study showed that family conflict was positively related to caregiving burden and the predictor in the final model was caregiving burden ( $\beta = 0.39$ ,  $P < 0.001$ ). From the Stress Process Model [16], family conflicts as secondary stressor, are role strains. These role strains are found in roles and activities outside the caregiving situation. Caregivers' role strains with caring of patients can lead to burden. The current study is consistent with the previous studies of Andren and Elmstahl [41] noting that family conflict was associated with caregiving burden ( $r = 0.54$ ,  $P < 0.001$ ). Similarly, Valente, Truzzi, Alves, Alves, Sudo, and Lanna and colleagues [42] reported that family conflict was associated with caregiving burden. This is consistent with previous studies, which also found that family conflict was the strongest factor influencing caregiving burden [43].

For the effects of self-esteem on caregiving burden, the finding in the final model showed that self-esteem was the predictor caregiving burden ( $\beta = -0.13$ ,  $P < 0.001$ ). This finding indicated that caregivers of dementia who had lower level of self-esteem had more caregiving burden. Self-esteem is 1 of the variables related to adaptation and well-being of caregivers. Specifically, high self-esteem is associated with better psychological health by reducing levels of anxiety, depression and burden. At the same time, high self-esteem is associated with increased social support and well-being [44]. Previous studies of Dyck, Short, and Vitaliano [20] noted that self-esteem had negative correlation with caregiving burden ( $r = -0.23$ ,  $p < 0.001$ ). The finding was consistent with a previous study of Chappell [45] who studied burden and well-being among caregivers, examined the distinction and found that self-esteem had significant positive correlation with caregiving burden.

With regard to the effects of coping on caregiving burden, the finding showed that coping had a moderate negative relationship with caregiving burden. The finding of the current study found that coping

was positively related to caregiving burden and in the final model showed that coping was the strongest predictor of caregiving burden ( $\beta = 0.41$ ,  $P < 0.001$ ). From the Stress Process Model [16], coping as mediators are strategies to lessen the effect of stress and reduce disturbance in mood. This relationship indicated that person with coping may manage a stressful situation and stress symptoms that result from the caregiving situations. The current study is consistent with the study by Zarit and Zarit [46] demonstrating that high levels of stress experienced by caregivers led to a number of negative effects, including feelings of burden. Moreover, coping was positively correlated with caregiver burden ( $r = 0.432$ ,  $P < 0.001$ ;  $r = 0.41$ ,  $P < 0.01$ ) [47,48] and was found to be a predictor of caregiver burden ( $\beta = 0.27$ ,  $p < 0.05$ ) [42]. Moreover, coping was a predictor of caregiving burden ( $\beta = .41$ ,  $p < 0.01$ ) and was a strongly mediated factor of caregiving burden. Notably, coping is well-known as a strong factor mediator to decrease caregiving burden among dementia caregivers.

Regarding the effects of social support on caregiving burden, the finding showed that social support had a negative relationship with caregiving burden. When the hypothesized model was tested, the finding showed that social support had negative direct influence on caregiving burden. Also, the final model showed that social support was the predictor of caregiving burden ( $\beta = -0.25$ ,  $P < 0.001$ ) and it had negative indirect effect on caregiving burden ( $\beta = -0.16$ ,  $p < 0.01$ ). This finding could explain that participants who perceived social support and received the assistance from their families were more able to ease their burden. Caregivers of dementia who had better social support from family may be able to adopt the recommended behaviors into their daily activities, manage and solve their health problems, modify their behaviors and work together with health care providers for achieving the optimum of treatment goals. Essentially, support from family is an important facilitative resource assisting caregivers of dementia patients who usually depend on caring from family members. It can help to reduce burden [21,49]. The finding is similar to that of previous studies which found that social support could reduce the caregiver burden, and some studies [16,47] showed that informal social support was related to reduction in the negative outcomes of caring. Also, without informal social support, the negative outcomes of caring increased [44]. It was reported that social support was negatively correlated with caregiver burden ( $r = -0.88$ ,  $P < 0.001$ ;  $r = -0.40$ ,  $P < 0.05$ ) [21,49].

## Conclusions

The results of the current study provide evidence to support the causal model of caregiving burden among dementia caregivers. The 5 proposed variables, including coping, self-esteem, family conflict, social support, and behavior disturbance, were found to be predictors of caregiver burden. Although behavior disturbances had no direct effect but it had a positive indirect effect on caregiver burden via family conflict. Thus, the knowledge of caregiver burden remained in final model. Coping was the most powerful variable influencing caregiver burden. All the five predicting variables, including behavior disturbance, coping, family conflict, social support, and self-esteem could explain 58 % of total variance in caregiver burden ( $R^2 = .58$ ). The findings of this study have been discussed based on the Stress Process Model [15] and the review of previous related studies. The purpose of this cross-sectional, predictive correlational design was to identify and test a causal relationship between behavior disturbances, coping, family conflict, self-esteem and social support and caregiver burden among dementia caregivers. The conceptual framework of this study was based on the Stress Process Model developed by Pearlin, Mullan, Semple, and Skaff [15] with a focus on the variables that could be modified by nursing intervention. The findings of this study revealed that coping and family conflict had a moderate positive relationship with caregiver burden. Self-esteem and social support had a low negative relationship with caregiver burden. However, behavior disturbance had no significant relationship with caregiver burden.

## Acknowledgements

The researcher gratefully acknowledges the support provided by the Faculty of Nursing, Chiang Mai University and thanks all the participants in this study.

## References

- [1] Alzheimer's Association. Alzheimer's disease facts and figures. *Alzheimers Dement.* 2013; **9**, 208-45.
- [2] A Wimo and M Prince. *World Alzheimer Report 2010*. The Global Economic Impact of Dementia. *Alzheimer's Disease International.* 2010.
- [3] Department of Health. *Living well with dementia*. A National Dementia Strategy, Department of Health, London, UK, 2009.
- [4] M Prince, AGM Wimo, GC Ali, YT Wu and M Prina. *World Alzheimer Report 2015: The Global Impact of Dementia: An Analysis of Prevalence, Incidence, Cost and Trends*. Alzheimer's Disease International, 2015.
- [5] V Senanarong, P Jamjumrus, K Harnphadungkit, S Vannasaeng, S Udompuntharak, N Prayoonwiwat and Pongvarin N. Risk factors for dementia and impaired cognitive status in Thai elderly. *J. Med. Assoc. Thai* 2001; **84**, 468-74.
- [6] D Lasuka. *Dementia in Thailand Current Situation in Global Collaboration Center*. Osaka University Booklet, 2014, p. 43.
- [7] Alzheimer's Association. Alzheimer's disease facts and figures. *Alzheimer's And Dementia. Alzheimer Dementia* 2016; **12**, 459-509.
- [8] GR Oliveira, JF Neto, SM Camargo, AL Lucchetti, DC Espinha and G Lucchetti. Caregiving across the lifespan. *Psychogeriatrics* 2015; **15**, 123-32.
- [9] National Health Examination Survey Office. The 4<sup>th</sup> National Health Examination Survey 2008 - 2009. Available from [http://www.nheso.or.th/download\\_file.php?content\\_id=14&down\\_id=8](http://www.nheso.or.th/download_file.php?content_id=14&down_id=8), accessed March 2014.
- [10] E Papastavrou, A Kalokerinou, SS Papacostas, H Tsangari and P Sourtzi. Caring for a relative with dementia: Family caregiver burden. *J. Adv. Nurs.* 2007; **58**, 446-457.
- [11] K Chwalisz and V Kisler. Perceive stress: A better measure of carer burden. *Meas. Eval. Counsel. Dev.* 1995; **28**, 88-98.
- [12] SM Robertson, SH Zarit, LG Duncan, M Rovine and EE Femia. Family caregivers' patterns of positive and negative affect. *Fam. Relat.* 2007; **56**, 12-23.
- [13] L Barclay, A Zemcou, J Blass and J Sansone. Survival in Alzheimer's disease and vascular dementias. *Neurology* 1985; **35**, 834-40.
- [14] JL Conde-Sala, J Garre-Olmo, O Turro-Garriga, J Vilalta-Franch and S Lopez-Pousa. Differential features of burden between spouse and adult-child caregivers of patients with Alzheimer's disease: an exploratory comparative design. *Int. J. Nurs. Stud.* 2010; **47**, 1262-73.
- [15] S Andren and S Elmstahl. The relationship between caregiver burden, caregivers' perceived health and their, sense of coherence in caring for elders with dementia. *J. Clin. Nurs.* 2008; **17**, 790-9.
- [16] LI Pearlin, JT Mullan, Semple and MM Akaff. Caregiving and the stress process: An overview of concepts and their measures. *Gerontologist* 1990; **30**, 583-94.
- [17] SI Finkel, J S Costa, G Cohen, S Miller and N Sartorius. Behavioral and psychological signs and symptoms of dementia: A consensus statement on current knowledge and implications for research and treatment. *Int. Psychogeriatr.* 1996; **3**, 497-500.
- [18] SL Sample. Conflict in Alzheimer's caregiving families: Its dimensions and consequences. *Gerontologist* 1992; **32**, 648-55.
- [19] M Rosenberg. *Society and the Adolescent Self-image*. Princeton University Press, Princeton, NJ, 1965.
- [20] DG Dyck, R Short and PP Vitaliano. Predictor of burden and infectious illness in schizophrenia caregivers. *Psychosom. Med.* 1999; **61**, 411-9.
- [21] CY Hsiao. Family demands, social support and caregiver burden in Taiwanese family caregivers living with mental illness: The role of family caregiver gender. *J. Clin. Nurs.* 2010; **19**, 3494-503.
- [22] SH Zarit, KE Reeve and J Bach-Peterson. Relatives of the impaired elderly: Correlates of feelings of burden. *Gerontologist* 1980; **20**, 649-55.

- [23] JB Schreiber, FK Stage, J King, A Nora and EA Barlow. Reporting structural equation modeling and confirmatory factor analysis results: A review. *J. Educ. Res.* 2006; **99**, 323-37.
- [24] JF Hair, WC Black, BJ Babin, RE Anderson and RT Tatham. *Multivariate Data Analysis*. 6<sup>th</sup> ed. Pearson Prentice Hall, New Jersey, 2006.
- [25] O Pankong. 2006, Effects of Self-help Group on Perceived Burden and Well-being of Caregivers of the Elderly Persons with Dementia. Master of Nursing Science Thesis, Burapha University, Bangkok, Thailand.
- [26] CS Carver, MF Scheier and JK Weintraub. Assessing coping strategies: A theoretically based approach. *J. Pers. Soc. Psychol.* 1989; **56**, 267-83.
- [27] C Kritpracha. 2004, Influences of Cognitive Representations of Breast Cancer on Emotional Responses and Coping in Thai Woman Newly Diagnosis with Breast Cancer. Doctoral Dissertation, The University of Michigan.
- [28] P Srimoragot. 1993, Effect of Supportive Counseling on Perceived Illness, Self- esteem, and Morale in Cervical Cancer Patients Undergoing Radiotherapy. Dissertation, Mahidol University, Bangkok, Thailand.
- [29] SJ Semple, TL Patterson, LR Temoshok, K Straits-Troster, JH Atkinson and W Koch and I Grant. Family conflict and depressive symptoms: A study of HIV-seropositive men. *AIDS Behav.* 1997; **1**, 53-60.
- [30] C Schaefer, JC Coyne and R S Lazarus. The health related functions of social support. *J. Behav. Med.* 1981; **4**, 381-406.
- [31] P Pipatananond. 2001, Caregiver Burden Predictive Model: An Empirical Test among Caregivers for the Schizophrenic. Doctoral Dissertation, Mahidol University, Bangkok, Thailand.
- [32] B Reisberg, SH Ferris, MJ de Leon and T Crook. The global deterioration Scale for assessment of primary degenerative dementia. *Am. J. Psychiat.* 1982, **139**, 1136-9.
- [33] N Thavichachart, K Phanthumchinda, S Chankrachang, R Praditsuwan, S Nidhinandana, V Senanarong and N Pongvarin. Efficacy study of galantamine in possible Alzheimer's disease with or without cerebrovascular disease and vascular dementia in Thai patients: A slow-titration regimen. *Int. J. Clin. Pract.* 2006; **60**, 533-40.
- [34] H Kim, M Chang, K Rose and S Kim. Predictors of caregiver burden in caregivers of individuals with dementia. *J. Adv. Nurs.* 2011; **68**, 846-55.
- [35] Y Arai, K Kumamoto, M Washio, T Ueda, H Miura and K Kudo. Factors related to feelings of burden among caregivers looking after impaired elderly in Japan under the Long-Term Care insurance system. *Psychiat. Clin. Neurosci.* 2004; **58**, 396-402.
- [36] LD Clyburn, MJ Stones, T Hadjistavropoulos and H Tuokko. Predicting caregiver burden and depression in Alzheimer's disease. *J. Gerontol. B Psychol. Sci. Soc. Sci.* 2000; **55**, S2-S13
- [37] M Grafstrom, L Fratiglioni and B Winblad. Caring for an elderly person: Predictors of burden in dementia care. *Int. J. Geriatr. Psychiatr.* 2004; **9**, 373-9.
- [38] W Black and O Almeida. A systematic review of the association between the behavioral and psychological symptoms of dementia and burden of care. *Int. Psychogeriatr.* 2004; **16**, 295-315.
- [39] RM Van der Linde, T Denning, FE Matthews and C Brayne. Grouping of behavioural and psychological symptoms of dementia. *Int. J. Geriatr. Psychiatr.* 2014; **29**, 562-8.
- [40] A Feast, M Orrell, G Charlesworth, N Melunsky, F Poland and E Moniz-Cook. Behavioural and psychological symptoms in dementia and the challenges for family carers: Systematic review. *Br. J. Psychiatr.* 2016; **208**, 429-34.
- [41] S Andren and S Elmstahl. The relationship between caregiver burden, caregivers' perceived health and there, sense of coherence in caring forelders with dementia. *J. Clin. Nurs.* 2008; **17**, 790-9.
- [42] LE Valente, A Truzzi, WF Souza, GS Alves, CE Alves, FK Sudo, ME Lanna, DM Moreira, E Engelhardt and J Laks. Health self-perception by dementia family caregivers: Sociodemographic and clinical factors. *Arq. Neuropsiquiatr.* 2011; **69**, 739-44.
- [43] MS Heinz. 2010, Dementia Caregiving Characteristics, Elder Impairment, and Caregiver Strain and Burden. Graduate Theses and Dissertations, Iowa State University, Ames, Iowa.
- [44] M Beyebach and MH Vega. *200 Tareas en Terapia Breve*. Herder, Barcelona, 2010.

- [45] NL Chappell and RC Reid. Burden and well-being among caregivers: Examining the distinction. *Gerontologist* 2002; **42**, 772-80.
- [46] SH Zarit and JM Zarit. *Mental Disorders in Older Adults: Fundamentals of Assessment and Treatment*. 2<sup>nd</sup> ed. The Guilford Press, New York, 2007.
- [47] LK George and L Gwyther. Caregiver well-being: A multidimensional examination of family caregivers of demented adults. *Gerontologist* 1986; **26**, 253-9.
- [48] PP Vitaliano, J Russo, HM Young, L Teri and RD Maiuro. Predictors of burden in spouse caregivers of individuals with Alzheimer's disease. *Psychol. Aging* 1991; **6**, 392-402.
- [49] GR Shurgot and BG Knight. Influence of neuroticism, ethnicity, familism and social support on perceived burden in dementia caregivers: Pilot test of the transactional stress and social support model. *J. Gerontol. B Psychol. Sci. Soc. Sci.* 2005; **60**, P331-P334.