1-1-1998

Development of a middle-range theory of caregiver stress from the Roy Adaptation Model

Pao-Feng Tsai

DEVELOPMENT OF A MIDDLE-RANGE THEORY OF CAREGIVER STRESS FROM THE ROY ADAPTATION MODEL

by

PAO-FENG TSAI

DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

1998

MAJOR: NURSING

Approved by:

11/4/98

Advisor Date

To the Lord

who press me to learn, to listen,

to be patient and to face the difficulties

Acknowledgments

My appreciation is expressed to Dr. Mary Jirovec, Dr. Marjorie Isenberg, Dr. Ann Horgas, and Dr. Jeffery Dwyer at Wayne State University, for the opportunities, challenges and guidance they have provided me.

I record grateful recognition of Dr. Michael Marsiske's and Dr. Douglas Baer's suggestion in dealing with the structural equation model and Zoe Koosis's excellent feedback and editorial suggestion in writing this dissertation.

Finally, I wish to thank to my parents, Tzay-Her Tsai and Mei-Tso Tsai-Chen, to my son, Jonathan Lee, and to Yuji Simon Zhou for their significantly support, encouragement and constant love.

TABLES OF CONTENTS

LIST OF FIGURES

Figures

LIST OF TABLES

Tables

CHAPTER 1

INTRODUCTION

Purposes of the Study

For 30 years, nursing scholars, administrators, and practitioners have urged the need for viable nursing theories to lay a firm foundation of the discipline and to guide nursing practice (Brown, 1964; Silva, 1986). This issue remains a major concern of nursing. Appropriate criteria provided by valid theories are necessary in evaluating and making adequate decisions regarding patient care (Roger, 1961). Moreover, sound theories will provide insights toward understanding emerging phenomena in nursing and are critical in decision making.

In addressing this need, various theories have evolved. Although they are successful in certain specific aspects of nursing, most of these theories have not been adequately validated. With few exceptions, they share some common drawbacks. Theoretical terms are poorly defined in some theories, especially in grand theories. Inaccurate propositions and untested formulations are also usually assumed. All this makes it difficult to test the theories empirically (Hardy, 1978). The situation is further aggravated by the fact that validation of nursing theory has been excluded from the mainstream of nursing as observed by Silva (1986), who surveyed five major nursing journals from 1952 to 1985. She found that only 9 of 62 studies adequately tested the theories of Roy, Johnson, Orem, Roger, and Newman.

Among these mainstay theories, the Roy Adaptation Model (RAM) is very common and has been applied in many studies (Fawcett, 1995). However, little effort has

been directed to test its validity. Exceptions were found only in three cases. Frederickson, Jackson, Strauman, and Strauman (1991) examined propositions derived from the RAM. Calvert (1989) tested the concepts of the model. Calvillo and Flaskerud (1993) tested both the RAM and gate control theory of pain in the context of cross-cultural pain response. However, they failed to identify the mediating role of coping mechanisms. Moreover, none of these researchers tested the RAM in the context of the chronic caregiving experience and their samplings were biased toward study convenience.

Only two studies-- Smith (1989) and Ellison (1993)--were conducted in the context of a chronic caregiving experience using the RAM. Neither, however, were intended to test the validity of the RAM. In these two studies, Smith (1989) neglected the role of control process and the effect of environmental stimuli on adaptation, and Ellison (1993) ignored the mediating role of coping mechanisms.

In summary, these studies were susceptible to either ignorance of the mediating role of coping mechanisms, the chronic caregiving experience, or bias in sampling. Therefore, it is the purpose of this study to derive and validate a middle-range theory of caregiving stress based on the RAM (Roy, 1984) with the inclusion of the above factors, which have been neglected in past research, and using appropriate statistical methods. With emphasis on the chronic caregiving experience, the specific aims of the research are:

1. To develop a middle-range theory of caregiver stress from the RAM that may predict caregiver stress and its outcome from demographic characteristics, objective burden in caregiving, stressful life events, social support, and social roles.

2. To specify the relationship among focal stimuli, contextual stimuli, and the

control process in the RAM by testing the relationship among objective burden in caregiving, stressful life events, social support, social roles, and perceived caregiver stress in the theory of caregiver stress.

3. To clarify the theoretical concept of "depression" in the theory of caregiver stress.

4. To revise and supplement the theory of caregiver stress based on statistical evidence.

The study was conducted by first deriving a specific theory from the RAM, and testing the validity of this theory with structural equation modeling. Based on the test results, the theory was adjusted predicated on the statistical data analysis of existing samples. The developed theory was cross-validated by another sample.

Overview of the Roy Adaptation Model

Assumptions

The philosophical and scientific assumptions on which the Roy Adaptation Model was based were explicitly stated (Roy, 1980, 1988; Roy & Corliss, 1993). Roy (1988) identified two philosophical principles, humanism and veritivity, and eight associated assumptions. Humanism acknowledges that the person and the subjective experience of human beings are the most important themes to knowing and valuing. Four specific assumptions are associated with humanism: "The individual (1) shares in creative power, (2) behaves purposefully, not in a sequence of cause and effect, (3) possesses intrinsic holism, and (4) strives to maintain integrity and to realize the need for relationship" (Roy, 1988, p. 32). The second philosophical principle is veritivity. On a broad level, veritivity

asserts the existence of absolute truth. Applied to human beings, veritivity claims that human existence has a unique and common purpose shared by all of mankind. Four specific assumptions are associated with veritivity: "The individual in society is viewed in the context of (1) the purposefulness of human existence, (2) the unity of purpose of humankind, (3) the activity and creativity for the common good, and (4) the value and meaning of life (Roy, 1988, p. 32)." Although Roy and Corliss (1993) reaffirmed the principles of humanism and veritivity as the philosophical bases, they did not expand their writing to cover these eight principles.

The scientific assumptions of the RAM were drawn from the general system theory (Bertalanffy, 1968) and the adaptation level theory (Helson, 1964). Eight scientific assumptions were explicated by Roy in 1980. They were modified in 1991 to specify how the scientific assumptions related to the systems theory and the adaptation level theory (Andrews & Roy, 1991a). Five assumptions were based on the systems theory: holism, interdependence, control processes, information feedback, and complexity of living systems. Adaptation level theory contributed to four assumptions of the RAM: (a) behavior as adaptive; (b) adaptation as a function of stimuli and adaptation level; (c) individual, dynamic adaptation levels; and (d) positive and active processes of responding. These nine scientific assumptions were further defined and explained by Roy and Corliss (1993). The most noticeable change is the assumption in 1980 that specified the relationship between a person's life and health and illness no longer existed in 1991 and 1993. Instead, 1991 and 1993 assumptions identified the function of information feedback and introduced the concepts of environmental and organismic forces. The scientific assumptions are shown in Table 1. 1.

Theory

The Roy Adaptation Model was developed by Sister Callista Roy in 1970. It incorporated concepts such as adaptation, stimuli, adaptation level, and coping mechanism. The theory was reformulated in 1976 to include the adaptive modes (Roy, 1976). A revision in 1981 introduced the classic theory that viewed the individual as an adaptive system, models of cognator and regulator subsystem, and the associated propositions (Roy & Roberts, 1981). In 1984, the model further incorporated four adaptive modes (Roy, 1984). Finally, the model was changed from a reactive worldview to a more holistic, interactive worldview in 1991 (Andrews & Roy, 1991a).

The model includes four constructs: input, control process, effectors, and output. The following section describes the relationship among these theoretical constructs. Figure 1.1 shows the RAM (Roy, 1984).

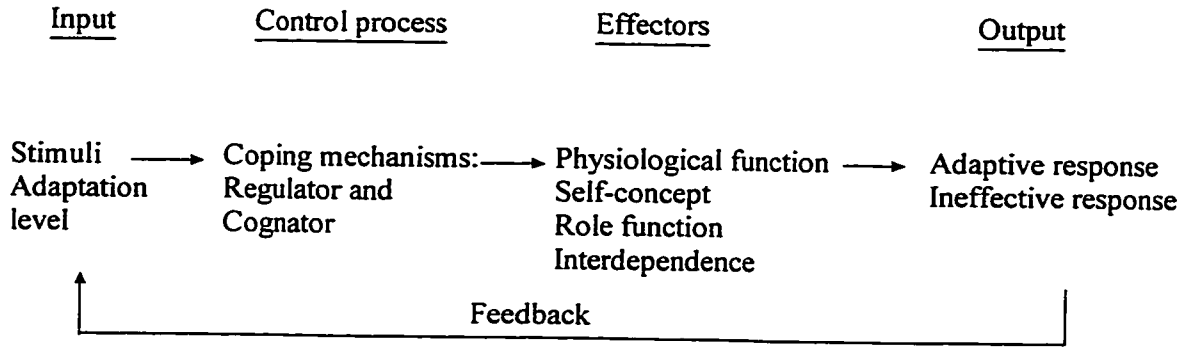


Figure 1.1. The person as an adaptive system (Roy, 1984).

Table 1.1
Scientific Assumptions of the RAM

Roy (1980, pp. 180-182)	Roy & Corliss (1993, pp. 216-217)
1. The person is a bio-psycho-social being.	1. Holism--a system is a set of units so related or connected as to form a unity or whole.
2. The person is in constant interaction with a changing environment.	2. Interdependence--a system is a whole that function as a whole by virtue of the interdependence of its parts.
3. To cope with a changing world, the person uses both innate and acquired mechanisms, which are biologic, psychologic, and social in origin.	3. Control Process--a system has inputs, outputs, and control and feedback processes.
4. Health and illness are an inevitable dimension of life.	4. Information Feedback--input, in the form of a standard or feedback, often is referred to as information.
5. To respond positively to environmental changes, the person must adapt.	5. Complexity of Living System--living systems are almost infinitely more complex than mechanical systems and have standards and feedback to direct their functioning as a whole.
6. The person's adaptation is a function of the stimulus exposed to and one's adaptation level.	6. Behavior as Adaptive--human behavior represents adaptation to environmental and organismic forces.
7. The person's adaptation level is such that it comprises a zone that indicates the range of stimulation that will lead to a positive response.	7. Adaptation as a Function of Stimuli and Adaptation level--adaptive behavior is a function of the stimuli and adaptation level, that is, the pooled effect of the focal, contextual, and residual stimuli.
8. The person is conceptualized as having four modes of adaptation: physiologic, self-concept, role function, and interdependence.	8. Individual, Dynamic Adaptation Levels--adaptation is a process of responding positively to environmental changes; this positive response decreases the responses necessary to cope with the stimuli and increases sensitivity to respond to other stimuli.
	9. Positive and Active Processes of Responding--responses reflect the state of the organism as well as the properties of stimuli and hence are regarded as active processes.

Input. The model assumes that the individual is an adaptive system affected by internal or external environments known as stimuli. Three kinds of stimuli are included in the model: focal, contextual, and residual. The focal stimulus is the internal or external stimulus that immediately confronts the person. Contextual stimuli are other identifiable factors contributing to the effect of the focal stimulus. Residual stimuli are factors that have unclear effects in the current situation (Andrews & Roy, 1991a).

Roy argues that each person has an adaptation level or range of ability to cope in a situation. Adaptation level is a changing point indicating the person's ability to respond positively to his/her environment (Andrews & Roy, 1991a). The adaptation level changes based on the presentation of various stimuli. In other words, environmental stimuli determine a person's adaptation level. Adaptive response to the environment is based on the pooled effects of presenting stimuli (e.g., focal stimuli, contextual stimuli, and residual stimuli) and the individual's adaptation level. When the pooled effects of the stimuli are greater than the individual's adaptation level, the resulting responses are ineffective. On the other hand, if the pooled effects of the stimuli are less than the individual's adaptation level, the responses are adaptive (Roy, 1976).

Control process. Coping mechanisms are innate or acquired responses to the environment. Innate coping mechanisms are viewed as automatic processes. By contrast, acquired coping mechanisms can be learned through experience. A person's coping mechanisms include regulator and cognator subsystems. The regulator subsystem responds through the neuro, chemical, and endocrine systems. The cognator subsystem responds through the processes of perception/information processing, learning, judgment, and emotion. Through perception/information processing, a person is able to perform

selective attention, coding, and memory procedures. Learning includes imitation, reinforcement, and insight. Judgment involves problem solving and decision making. Emotion leads to defenses as a way to seek relief from anxiety and to make affective appraisal and attachments. Environmental inputs to the regulator system activate the cognator system through a perception process and vice versa. The behaviors or responses resulting from regulator and cognator mechanisms can be observed in four adaptive or effector modes (Andrews & Roy, 1991a).

Effectors. The behavior resulting from regulator and cognator mechanisms can be observed in four adaptive modes: physiological function, self-concept, role function, and interdependence. These modes are manifestations of cognator and regulator activities. The first mode is the physiological function mode reflecting the body's physiological functions. It is the way a person responds physically to environmental stimuli (Andrews & Roy, 1991a).

The second adaptive mode is self-concept, defined as the composite of beliefs and feelings toward the self at a given point of time (Andrews & Roy, 1991a). It focuses on the person's psychological and spiritual aspects. Psychological integrity, the basic need of the self-concept mode, affects a person's ability to heal or maintain health. The self-concept mode consists of two areas--physical self and personal self. Physical self contains two subareas--body sensation and body image. Personal self includes self-consistency, self-ideal, and moral-ethical-spiritual self.

Role function mode is the third adaptive mode, focusing on a person's societal role. It is the way a person behaves toward his/her position in reference to expectations (Andrews & Roy, 1991a). Social integrity is the basic need of the role function mode.

Assessing a person's instrumental and expressive behaviors associated with his/her role is useful for understanding the person's role function.

The fourth mode is interdependence. It reflects how an individual demonstrates willingness and ability to love, respect, and value others, and to accept and respond to love, respect, and value given by others (Tedrew, 1991). In other words, this adaptive mode focuses on the person's behavior related to giving and receiving love, respect, and value--namely, his/her contributive and receptive behavior. The basic need in this mode is affectional adequacy, the feeling of security in nurturing relationships.

Output. Output is the response or behavior that results from the coping process. It is an internal or external action or reaction under a certain circumstance. The output portion of the RAM involves evaluation of whether the individual has adaptive responses in terms of goal adaptation. There are two types of output. Adaptive response is the response that promotes the integrity of the person in achieving the goal of adaptation-survival, growth, reproduction, and mastery (Andrews & Roy, 1991a). Ineffective response, on the other hand, is the response that interrupts the person's integrity (Andrews & Roy, 1991a). Responses act as feedback to the adaptive system. That is, these responses later become additional stimuli to the adaptive system, allowing the individual to decide whether to increase or decrease the effort to cope with the situation, or to decide how to cope with the stimuli (Andrews & Roy, 1991a).

The Theory of Caregiver Stress

Assumptions

The theory of caregiver stress was derived from the Roy Adaptation Model (Roy,

1984). There are four assumptions in this theory. Assumptions 1 and 2 are assertions made in the RAM; assumptions 3 and 4 reflect the assumptions of the RAM.

1. Caregivers can respond to environmental change (Andrews & Roy, 1991a).

2. Caregivers' perception decides how caregivers respond to environmental stimuli. Therefore, the intactness of perception influences caregivers' adaptation (Roy & McLeod, 1981).

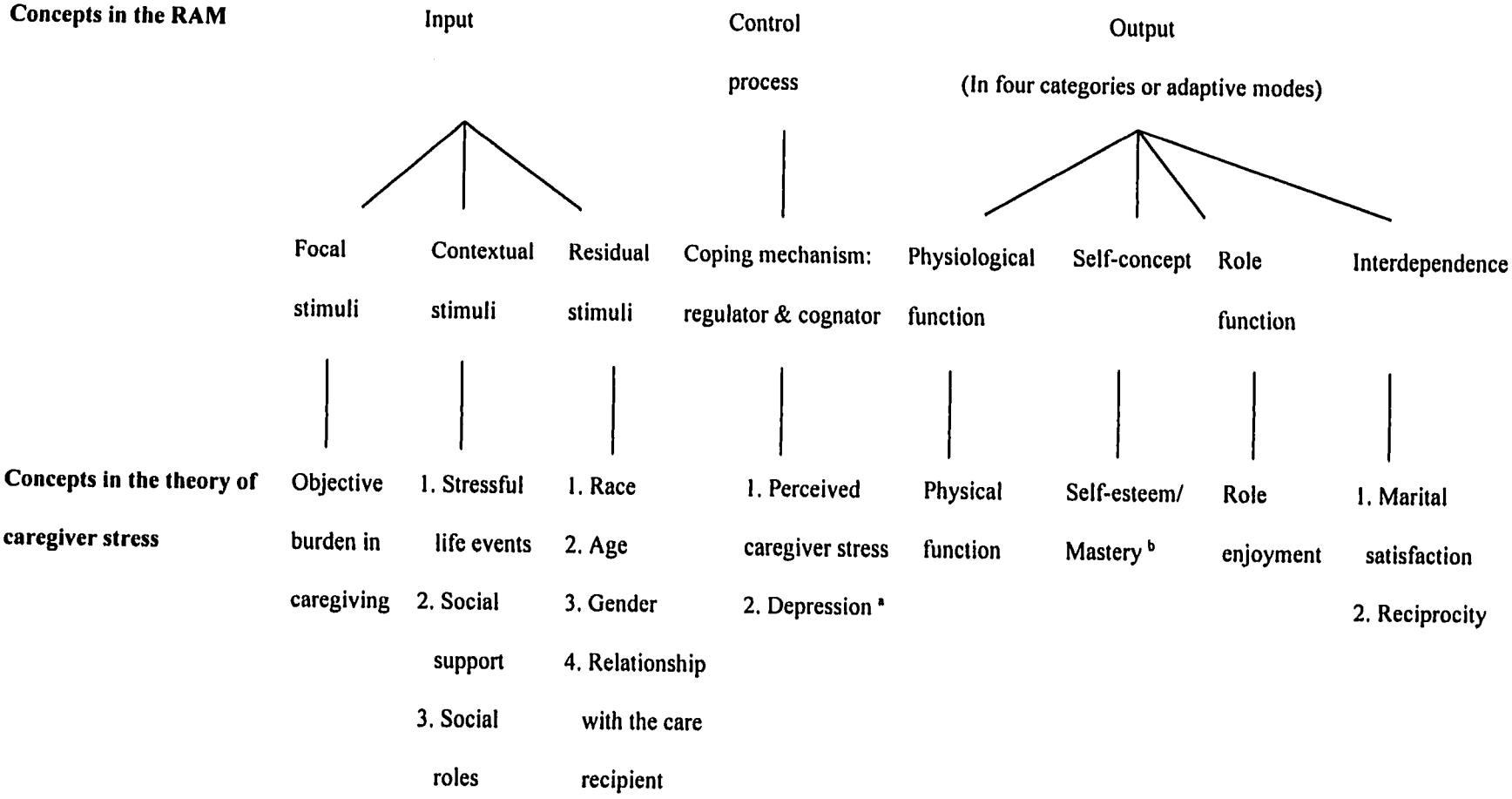
3. Caregivers' adaptation is a function of environmental stimuli and the adaptation level.

4. Caregivers' effectors--for example, physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity--are results of chronic caregiving.

Theory

The conceptual-theoretical structure for this theory is depicted in Figure 1.2. The figure differentiates between concepts in the RAM and the theory of caregiver stress according to the level of abstraction (Fawcett & Down, 1992). The first level is most abstract, represented by concepts of the RAM. The next level consists of concepts in the theory of caregiver stress. A logically congruent link between the concepts of the RAM and the concepts of the theory of caregiver stress is shown to provide the specificity in concepts necessary for testing. Figure 1.3 further depicts the theory of caregiver stress.

Input. According to the RAM, the coping mechanism is activated based on the level of stimuli and a person's adaptation level. In the theory of caregiver stress, the caregiver's objective burden is identified as a focal stimulus. Stressful life events, social support, and social roles are contextual stimuli while race, age, gender, and relationship



a. Depression was hypothesized to be either part of the coping mechanism or an adaptive mode. It was discussed in the theoretical framework and literature review sections (Chapter 2).

b. Self-esteem/mastery was combined to reduce parameters and to avoid the problem of collinearity in the method section (Chapter 3).

Figure 1.2. Major conceptual-theoretical structure.

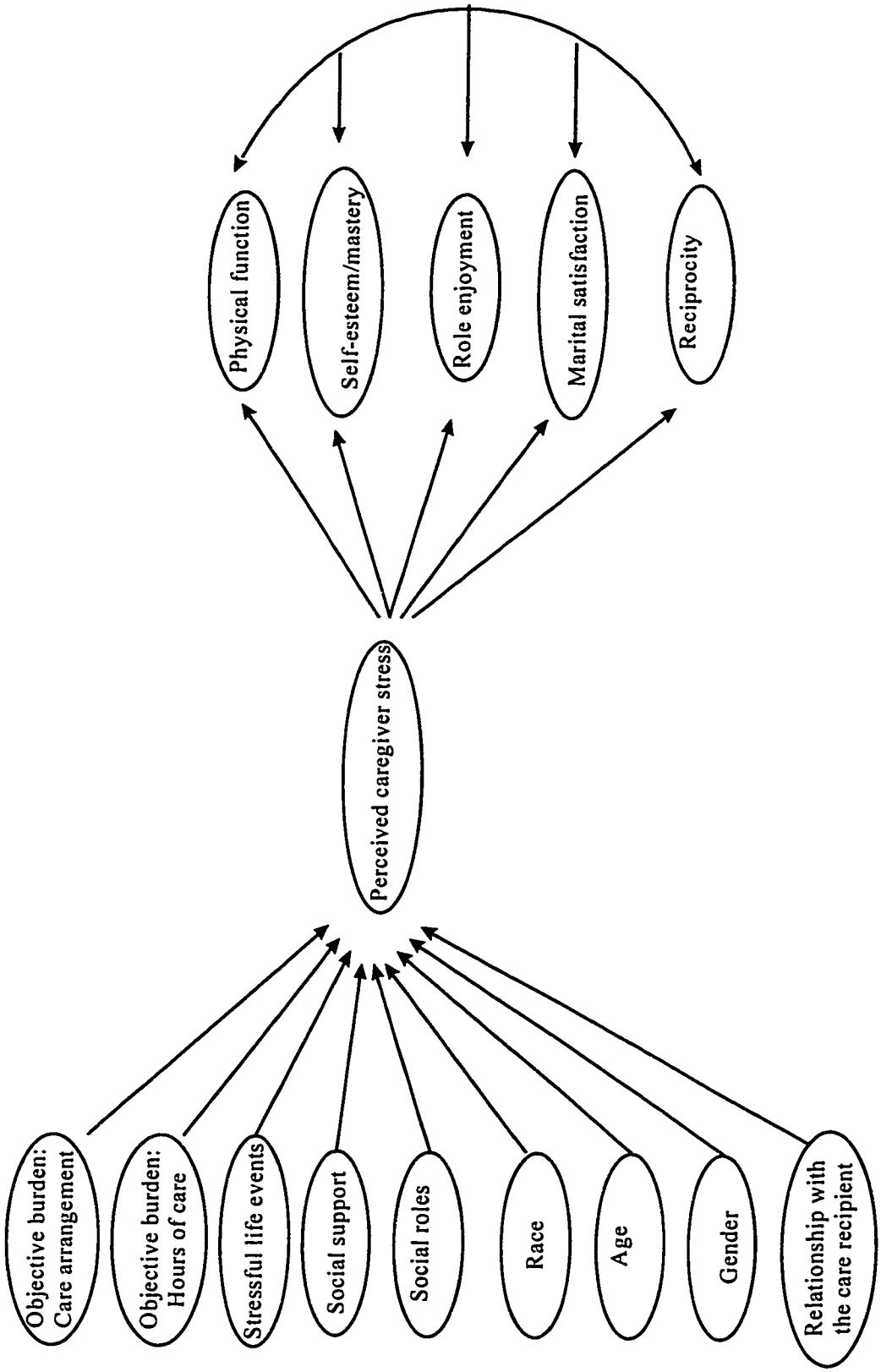


Figure 1.3. Model of caregiver stress. The model depicts the theory of caregiver stress.

are residual stimuli. No effort is made to identify the caregiver's adaptation level because the adaptation level is the combined effect of major relevant environmental stimuli--focal, contextual and residual (Andrews & Roy, 1991a).

Objective burden in caregiving represents the focus stimulus experienced by a caregiver. Objective burden is the duties or work associated with chronic disease caregiving. It may disrupt the caregiver's life in terms of finances, other roles, and interpersonal relationships (Thompson & Doll, 1982). In the theory of caregiver stress, objective burden in caregiving is the focal stimulus which activates the coping process and prompts caregivers to seek available physical and psychological resources to cope with caregiving. Although other stimuli, such as contextual and residual stimuli, also influence perceived caregiver stress, the caregiver's objective burden is the most important stimulus leading to caregiver stress.

Contextual stimuli contribute to the effect of focal stimuli on the adaptation process or moderate the relationship between focal stimuli and the coping mechanism. In the theory of caregiver stress, the caregiver's contextual stimuli, stressful life events, social support, and social roles either add to the effect of objective burden (focal stimulus) or moderate the relationship between objective burden in caregiving and perceived caregiver stress (coping mechanism). The function of contextual stimuli will be discussed in detail in the control process section.

Stressful life events are discrete changes in life conditions that evoke distress or challenge the individual (Rabkin, 1993). In the theory of caregiver stress, they are conceptualized as incidents beside caregiving, which produce caregiver stress. Stressful life events have been treated as one type of stressor in the stress literature. Several

hypotheses have been proposed to explain the relationship between stressful life events and adverse health outcomes (Dohrenwend & Dohrenwend, 1981). Some researchers have argued that stressful life events represent opportunities as well as hazards. Stressful life events resolved successfully do not lead to stress (Turner & Avison, 1992). However, stressful events demand the caregiver's immediate attention or action, in addition to his/her care for a chronically ill relative. As a result, an otherwise stable adaptation process of caregiving may be disturbed by stressful events and the caregiver may demonstrate a different pattern of adaptation. Based on these arguments, the theory of caregiver stress proposed here is that caregivers with stressful life events may experience a higher level of perceived caregiver stress than those caregivers without stressful life events.

By contrast, social support from family, relatives, or friends may help reduce the level of stress experienced by the caregiver. Social support has been defined in a variety of ways. Cobb's (1976) classic definition describes social support as information that makes the individual believe that he/she is cared for and loved, respected, and involved in mutual obligations in his/her network. Social support has also been defined in a less interpersonal way. For example, Caplan, Robinson, French, Caldwell, and Shinn (1976) stated that social support is the input provided by an individual or a group to move the receiver toward the goal of his/her desires. Shumaker and Brownell (1984) defined social support as "the exchange of resources between at least two individuals perceived by the provider or the recipient to be intended to enhance the well-being of the recipient (p13)." Another definition involves identifying specific supportive activities. For example, Barrera and Ainlay (1983) identified six types of supportive behaviors: material aid,

behavioral assistance, intimate interaction, guidance, feedback, and positive social interaction. Wortman (1984) differentiated six types of social support: expression of positive affection, expression of agreement, encouragement of open expression of feelings, offer of advice, provision of tangible aid, and provision of information. In addition to the above definitions, Cutrona (1990) classified social support into five dimensions—emotional, esteem, tangible, information, and social integration. The difference between Barrera and Ainlay's, Wortman's, and Cutrona's classifications is that both Barrera and Ainlay, and Wortman focused on the functional characteristics of social support, while Cutrona combined structural and functional social support.

Although social support is considered a multidimensional construct and has been operationalized in divergent ways, the quality of social support is well recognized to have greater impact on outcomes than quantity of social support (Antonucci, 1985). Therefore, in the theory of caregiver stress, no effort is made to identify the types and the exact amount of support. Social support is broadly defined as the perceived resources available to the caregiver for meeting the demand of caregiving and enhancing the well-being of the caregiver. Caregivers with more social support show lower levels of perceived caregiver stress than caregivers with less social support.

Social role is defined as a "pattern of expectations which apply to a particular social position and which normally persist independently of the personalities occupying the position" (Sieber, 1974, p569). In the theory of caregiver stress, social roles is defined as the caregiver's function or responsibility toward other people in other aspects of life (e.g., worker, parent, volunteer).

The function of social roles has been disputable in the literature. The scarcity

hypothesis suggests that the demands of the social organization are beyond the limited energy and resources at an individual's disposal. As a result, one is always short of energy for fulfilling his/her role obligation. Role strain and compromises, therefore, are inevitable (Coser, 1974; Goode, 1960; Slater, 1963). On the other hand, the expansion hypothesis (Marks, 1977; Sieber, 1974) argues that the rewards from multiple roles more than offset the costs of having multiple roles. More role involvement is considered to enhance well-being. In the context of the chronic caregiving, I argue that social roles outside caregiving may be straining but may provide instrumental or emotional support to the caregiver. Lack of social roles beyond that of caregiver may produce ineffective response, because there is limited social contact for the expression of emotional frustration. On the other hand, caregivers with too many social roles may experience adverse caregiving outcomes, such as loss of self (one dimension of self-concept), because of the time expenditures. The theory of caregiver stress hypothesizes that caregivers' social roles have an impact on their perceived stress. The predicting direction, however, cannot be predetermined.

Residual stimuli, such as the caregiver's race, age, gender, and relationship with the care recipient, also contribute to the effects of the focal stimuli—that is, objective burden in caregiving. However, the effects of residual stimuli in the adaptation process are unclear. Race is defined as a group of people related by common decent, blood, or heredity (Stein, 1988). Because of these common denominators they may shared a set of socially shared norms about the nature of the physical and social world, the goals of life, and the means of achieving them. Race is defined as the ethnic group that a caregiver is acknowledged in this study. Social norms associated with a particular ethnic group may

further influence and sharp the living of caregivers.

Age is defined as the stage of orderly change in human behaviors occurring gradually over a lifetime due to maturation (Sato, 1984), or the length of time during which a being or thing has existed (Stein, 1988). In this study, it refers to the caregiver's chronological age, indicating both his/her developmental stage and the length of time since birth.

Gender is the sum of the structural and functional differences by which males and females are distinguished (Stein, 1988). It refers to the caregiver's distinct structural and functional characteristics by which he/she is identified as a male or a female.

Relationship is defined as a group of people relating to each other through marriage, blood, or adoption, or members united through specific patterns regardless of ties. They live either in a single household or other structure, interact through social role or special pattern, and share common physical and cultural surroundings (Sato, 1984). In the context of caregiving, it is the caregiver's association or connection with the care recipient.

Based on the literature, young, white, and female caregivers tend to experience higher stress than other caregivers. Spouse caregivers may experience caregiving outcomes different from those of other groups of caregivers. In addition, the importance of the relationship with the care recipient is in its relation to the caregiver's burden in caregiving and the caregiver's perception of stress. Therefore, the theory of caregiver stress posits that race, age, gender, and relationship with care recipient, as a group of residual stimuli, influence perceived caregiver stress in some way.

Control Process. The causal path between environmental stimuli and adaptive

modes was not specified in the 1984 RAM. The model in 1991 proposed: (a) that an individual's response is the function of environmental stimuli and his/her adaptation level; and (b) that behavior results from the control process (Andrews & Roy, 1991a). According to these two propositions, an individual's adaptation responses are influenced by environmental stimuli and the adaptation level. However, adaptation responses are processed through the control process or coping mechanism. This means that the control mechanism is the mediating variable between environmental stimuli and adaptive modes. In other words, the relationship between stimuli and adaptation is indirect. As such, the theory of caregiver stress hypothesizes that environmental stimuli—such as objective burden in caregiving (focal stimulus), social support, stressful life events, social roles (contextual stimuli), and residual stimuli—produce adaptation responses in four effective modes or four categories through the perceived caregiver stress. In the absence of perceived caregiver stress, objective burden, stressful life events, social support, social roles, and residual stimuli have no influence on the caregiver's adaptive modes. In addition, Andrews and Roy (1991a) stated that coping mechanisms manifest through four adaptive modes or effectors. Behaviors resulting from the regulator and cognator subsystems can be observed in four adaptive modes or four categories. Therefore, the theory of caregiver stress hypothesized that perceived caregiver stress influences the caregiver's adaptive modes directly. High perceived caregiver stress results in an ineffective response: lower levels of physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity.

Perceived caregiver stress is the perceptual component of the coping mechanism, including the activities of both cognator and regulator subsystems. Processes of

perception are part of cognator activities. Through perception/information processing, a person is able to perform selective attention, coding, and memory. Perception also plays a role in linking the regulator subsystem to the cognator subsystem. According to Andrews and Roy (1991a), input to the regulator also produces perception. Roy and McLeod (1981) observed that neural inputs to regulator subsystem are transformed into conscious perception in the brain, although the process is unclear. Thus, perception bridges the activities between cognator and regulator subsystems. In the theory of caregiver stress, perceived caregiver stress is defined as the caregiver's cognitive appraisal of stress related to caring for a chronically ill relative or friend. It is the perceptual component of coping mechanism, including both cognator and regulator activities, at one point in time.

The effects of contextual and residual stimuli on the control process need clarification in the RAM. Both type of stimuli are treated as mediators between focal stimuli and the coping process; (b) stimuli indirectly influencing the coping process through focal stimuli; (c) factors additive to the effect of focal stimuli; or (d) moderators between focal stimuli and the coping process. The possible relationships among focal stimuli, contextual stimuli, residual stimuli, and the coping process are shown in Figure 1.4.

Roy and McLeod (1981) considered contextual stimuli and residual stimuli as factors mediating the effect of focal stimuli on the coping mechanism (mediating effects of contextual and residual stimuli). They argued that these factors also contribute to the effect of focal stimuli (additive effects). In addition, they suggested that focal stimuli

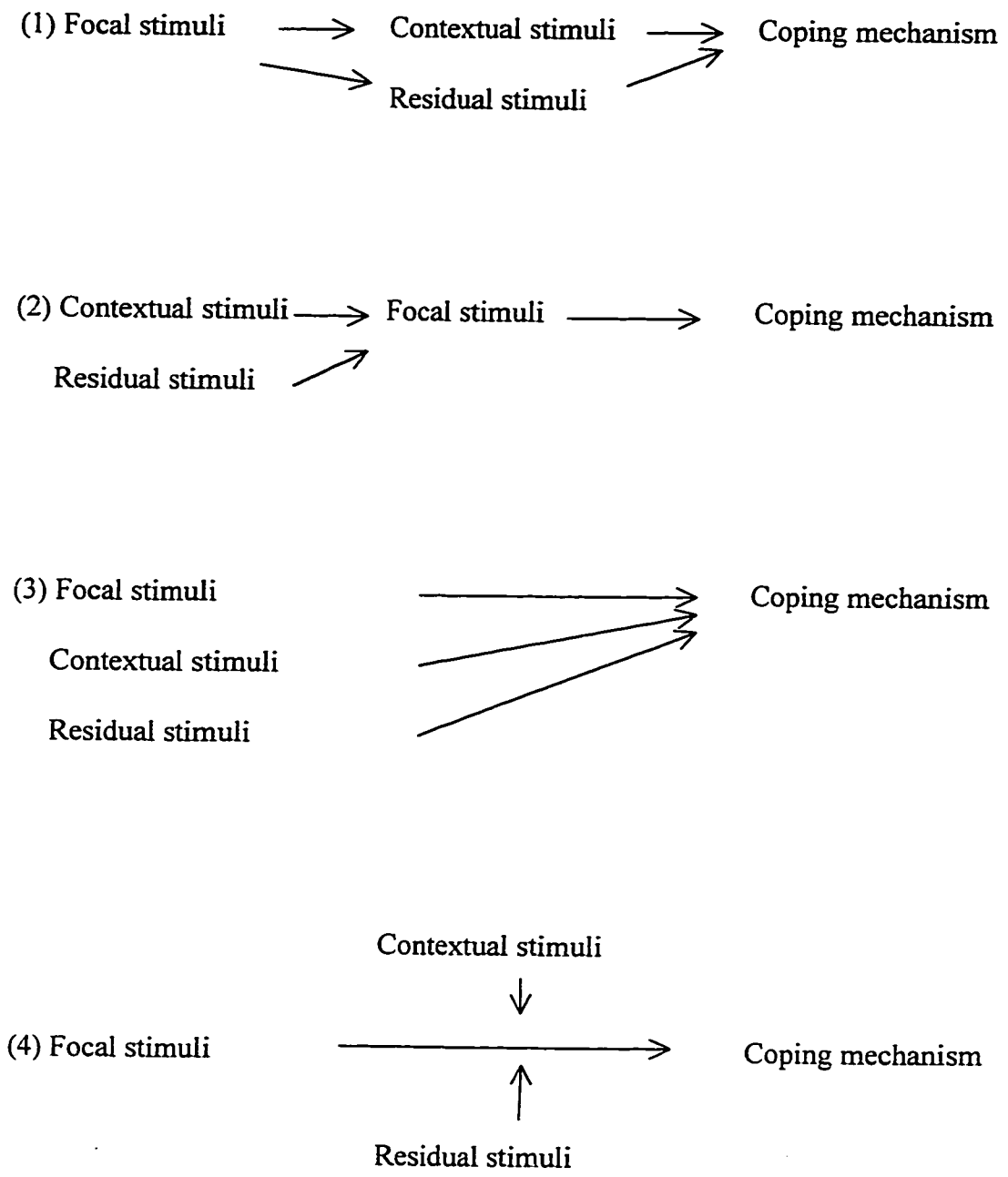


Figure 1.4. Possible relationships among three types of stimuli and the coping process.

mediate the effect of contextual and residual stimuli on the coping mechanism (mediating effects of focal stimuli) at the same time. Such inconsistencies were recently revised by Andrews and Roy (1991a).

Andrews and Roy (1991a) emphasized the contribution of contextual and residual stimuli to the effect of focal stimuli (Figure 1.4 [3]). They eliminated the mediating roles of contextual stimuli and residual stimuli (Figure 1.4.[1]), as well as mediated effect of focal stimuli (Figure 1.4.[2]). Their arguments, however, are complicated by introducing contextual and residual stimuli as moderators of the effect of focal stimuli on coping mechanism (Figure 1.4.[4]). The present research clarifies the relationships among the two types of stimuli (focal and contextual) and the coping mechanism. In the theory of caregiver stress, contextual stimuli (stressful life events, social support, and social roles) are conceptualized in two ways. First, they are the moderators between focal stimuli (objective burden in caregiving) and the coping mechanism (perceived caregiver stress) (Figure 1.4.[4]). Second, they only have additive effects on the coping mechanism (Figure 1.4.[3]). In other words, the theory of caregiver stress suggests that stressful life events, social support, and social roles may moderate the relationship between objective burden and perceived caregiver stress, and/or add to the effect of objective burden on perceived caregiver stress. However, stressful life events, social support, and social roles may act differently on perceived caregiver stress.

A review of the literature on contextual stimuli and coping mechanisms showed that stressful life events, social support, and social roles affect perceived caregiver stress. However, the way they influence coping mechanisms is different. Stress literature treats stressful life events as one type of stressor in relation to an individual's well-being.

Several hypotheses have been proposed to explain the relationship between stressful life events and health outcomes (Dohrenwend & Dohrenwend, 1981). Most describe the direct relationship between stressful life events and adverse health outcomes. The stress-strain hypothesis proposes that psychophysiological strain mediates the impact of life events on health outcomes. That is, stressful life events directly affect psychological strain, which in turn affects health outcomes. Based on these arguments, the theory of caregiver stress proposes that stressful life events have an additive effect on the coping mechanism over and beyond the effect of objective burden (Figure 1.4.[3]).

Social support affects caregiver stress; it improves the caregiver's personal well-being and prevents him/her from burdensome. In the context of caregiving, social support has been conceptualized as a moderator as well as a mediator in the stress process. According the caregiver stress-coping model (George, 1980; House, 1974) and the stress-process model (Pearlin, 1989; Pearlin, Lieberman, Menaghan, & Mullan, 1981; Pearlin, Mullan, Sample, & Skaff, 1990), social support conditions the effect of caregivers' stressors on health outcomes. In addition, the caregiver stress-coping model also suggests that social support buffers the effect of caregiving stressors on perceived stress (George, 1980; House, 1974). On the other hand, Pearlin (1994) asserted that social support has both moderating and mediating effects on the caregiver's stressors/strains relationship. Social support may inhibit the subjective aspects of primary stressors, act as barriers to .the development of secondary role strains, and may discourage the production of intrapsychic strains. Based on these arguments, social support either moderates and/or mediates the influence of the caregiver's stressors on perceived stress. However, the mediating effect of social support on perceived stress conflicts with the current model of

the RAM. Although the mediating effect of social support on caregiver stress needs to be further explored, it is beyond the scope of this present research. Simply, the theory of caregiver stress posits that a caregiver's social support moderates the relationship between objective burden and perceived caregiver stress (Figure 1.4.[4]).

Social roles may buffer caregivers from stress. According to the expansion hypothesis (Marks, 1977; Sieber, 1974), multiple roles contribute to the well-being of an individual by providing complementary resources across role domains. Multiple roles are also beneficial through the buffering effects of one role on stress experience in another. In the context of caregiving, the other social roles may provide an additional outlet for the expression of emotional frustration. Therefore, the theory of caregiver stress hypothesizes that social roles moderate the effect of focal stimuli (objective burden in caregiving) on perceived caregiver stress (Figure 1.4.[4]).

Effectors. Coping mechanisms manifest through four adaptive modes or effectors. Behaviors resulting from the regulator and cognator subsystems can be observed in four adaptive modes or four categories (Andrews and Roy, 1991a). That is, four adaptive modes can be treated as four categories of responses, which are also the output component of the RAM. Therefore, in the theory of caregiver stress, the effector portion of the model will not be specified because the output portion provides the same information. Four effector modes are treated as four categories of output in the theory of caregiver stress.

Output. Responses are defined as behaviors in Roy's model. They can be measured, observed, or subjectively reported. Behaviors are defined as internal or external actions and reactions under specified circumstances. An individual's behaviors

fall into four categories: the physiological, self-concept, role function, and interdependence modes (Andrews & Roy, 1991a). Two categories of responses in the output portion of the RAM—adaptive response and ineffective response—are evaluated based on the goal of adaptation. This provides information for future intervention and management.

According to Andrews and Roy (1991b), the physiological mode manifests itself in one's oxygenation, nutrition, elimination, activity and rest, protection, sense, fluid and electrolytes, neurological, and endocrine functions. In the theory of caregiver stress, physical function is the proxy of physiological function. It is defined by the way a caregiver responds physically to environmental stimuli. It reflects the caregiver's overall physical reaction to internal or external environments. Physical malfunction indicates the ineffective response of physiological function, whereas high physical function presents adaptive response.

The self-concept mode in the RAM consists of two subareas: the personal self and the physical self. Self-esteem and mastery will be used to represent the personal self-dimension of self-concept. Self-esteem refers to an individual's perception of self-worth (Andrews, 1991a). In the theory of caregiver stress, self-esteem refers to a caregiver's perception of self-worth. It is the caregiver's feeling and perception of how important he/she is in relation to him/herself or toward other persons. Low self-esteem demonstrates ineffective response whereas high self-esteem represents adaptive response.

Mastery is the opposite concept of powerlessness in the RAM. Powerlessness is defined as the individual's perception of lack of internal or personal control over events (Buck, 1991). In the theory of caregiver stress, mastery refers to the caregiver's

perception of his/her ability to handle or control things in life. Low mastery demonstrates ineffective response. Conversely, high mastery represents adaptive response.

The role function mode is viewed as a caregiver's instrumental and expressive behaviors. The level of both behaviors indicates a person's level of role mastery. How a person behaves to achieve the goal is referred to as instrumental behavior, which normally contains physical actions. Expressive behavior is a person's feelings and attitudes about his role and role performance (Andrews, 1991b). In this study, role enjoyment, defined as caregivers' expressive behavior to their major social role, will be used to represent the role function. Low role enjoyment demonstrates ineffective response, whereas high role enjoyment represents adaptive response.

The interdependence mode refers to the specific relationships with significant others and the social system. Behaviors that demonstrate interdependent needs are receiving and giving behaviors. Significant others are defined as the most important persons in one's life, because they are those who are loved, respected, and valued. A social system, which provides the same functions of giving and receiving love, respect, and value also, contributes to one's interdependent needs. It includes social and work groups as well as persons and animals (Tedrow, 1991). In the theory of caregiver stress, marital satisfaction, and reciprocity are used to represent the caregiver's interdependence mode. Marital satisfaction is the nature or characteristics of the relationship between the caregiver and his/her spouse/partner. It is the result of a caregiver's receptive and contributive behavior with the spouse/partner. Low levels of marital satisfaction demonstrate ineffective behavior whereas high levels of marital satisfaction represent adaptive response.

Reciprocity represents caregivers' receptive and contributive behavior with other social system, such as friends and relatives. Although reciprocity often is addressed in relation with filial obligation, it can also be applied to the exchange behaviors between kin or non-kin. Reciprocity exchanges are used to initiate and maintain relationships. In addition, it reinforces the obligation in existing relationships (Foster, 1963). Balanced reciprocity refers to exchanges in which an equivalent of the things received is returned within a finite time period (Sahlins, 1965). It is basic to defining relationships in kin and non-kin relationships (Wentowski, 1981). Balanced reciprocity produced trusted, satisfied relationships on both sides.

Two theoretical aspects are related to individuals' helping behaviors, such as reciprocity. First, sociological explanations emphasize the role of social norms. The reciprocity norm directs people to pay back what others give to them (Brickman, et al., 1982). Second, sociobiology believes that helping behaviors can only be understood in terms of the evolutionary past of human beings. Close relatives help each other in order to increase the chance of preserving the gene pool in their family (Forsyth, 1987). Based on these two aspects, intrafamilial helping behaviors either fulfill the social norm or maintain the family's gene pool. Thus intrafamilial helping of all types is desirable.

Caregivers reporting objective burden in caregiving may experience role strain and drained resources. When resource and role constraints demand that priorities be set among those who can be helped, we can expect that resources will be allocated to familial members rather than nonfamilial members, such as friends and relatives. As such, unbalanced reciprocity may occur between caregivers and their friends and relatives. Caregivers' friends and relatives may provide more support than the support provided by

caregivers. Therefore, in the theory of caregiver stress, reciprocity is the caregiver's contributive behavior to friends and relatives. Higher levels of reciprocity represent adaptive response whereas low level of reciprocity demonstrates ineffective response.

Although the specific paths among the four modes are not discussed in the RAM, it suggests that the fours adaptive modes are interrelated (Andrews & Roy, 1991a). These modes are viewed separately only for purposes of demonstration, teaching, and assessment. Stimuli processed by either the regulator or the cognator subsystem would potentially manifest in all modes. The possible reason is that a response in one mode would become an input stimulus to the cognator or the regulator subsystem and may manifest itself in another mode. Moreover, through coping mechanisms, the effect of a stimulus may appear through one or more modes. Therefore, the theory of caregiver stress hypothesizes that the caregiver's adaptive modes should be interrelated without specific causal paths. Different dimensions of the caregiver's adaptation, physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity are correlated because objective burden in caregiving may affect more than one mode, or because one particular behavior may be indicative of adaptation in more than one mode.

Depression. In addition to four modes, caregiving studies frequently use depression as the outcome of caregiving. Although stress response is inherently multidimensional, it is often assessed by means of a single measure, such as depression (Elliott & Eisdorfer, 1982). In the context of caregiving, depression is the most frequently studied symptom among caregivers. For example, Pearlin (1994) asserted that affective states—depression, anxiety, and anger, in particular—are likely to be the first and readily aroused psychological outcomes of the stress process. House (1974), George (1980),

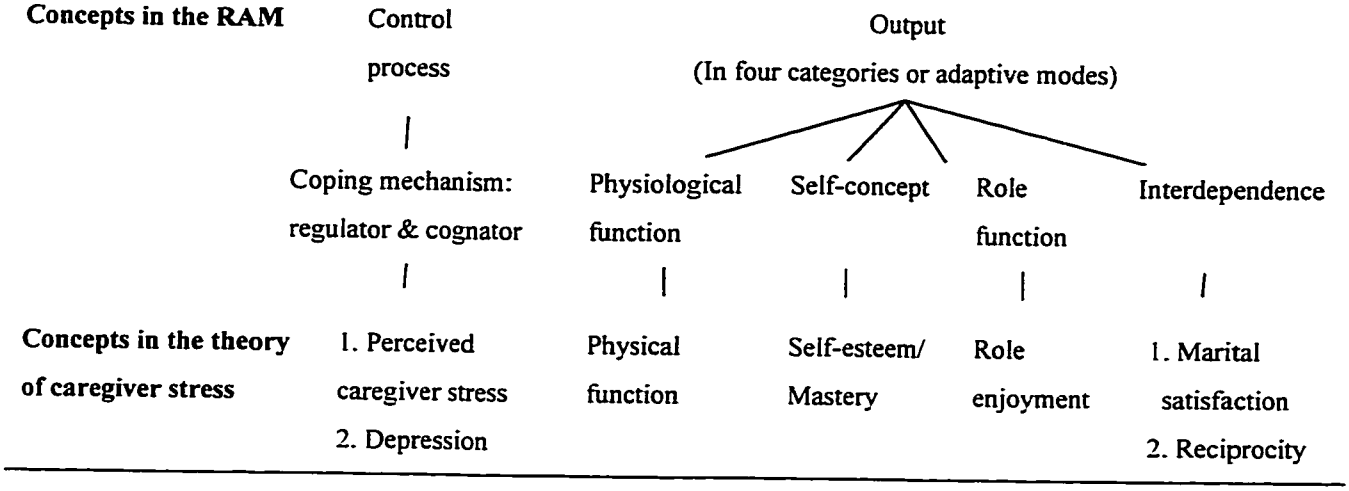
Schulz (1990), and Aneshensel, Pearlin, Mullan, Zarit and Whitlatch (1995) also claimed that depression is one of the enduring psychological outcomes for caregivers. Many psychiatric fields have considered depression a problem related to self-concept (Fry, 1984). Roy (1984) stated that: (a) a disruption in any mode potentially leads to depression; (b) depression can be assessed in each mode; and (c) in some respects, depression might be viewed as a coping mechanism. For example, people may psychically release themselves from conflict by using immobilization, one symptom of depression. Roy (1984) also mentioned that "depression is a reaction of the person to a real or perceived stress or threat" and it "occurs within or across the adaptive modes."

Based on these statements, Roy did not clearly specify the relationships among depression, coping mechanisms and adaptive modes. Roy (1984) claimed that depression is either the coping mechanism and the immediate outcome of stress, or the outcome of the adaptation process. Therefore, depression can be viewed in the following ways: (a) depression is part of the coping mechanism, an immediate outcome of perceived caregiver stress; or (b) depression manifests itself in four adaptive modes. The theory of caregiver stress attempts to solve this puzzle. The theory proposes that depression is the outcome of perceived caregiver stress. Whether depression is control process or output will be clarified by this study. The possible locations of depression in the conceptual-theoretical structure are shown in Figure 1.5. The possible relationship among perceived caregiver stress, depression, and the four adaptive modes are shown in Figure 1.6. It is possible that (a) both depression and perceived caregiver stress are coping mechanisms, and that depression is the emotional portion of the cognator subsystem and the immediate outcome of perceived caregiver stress (Figure 1.6.[1]); (b) depression is the outcome

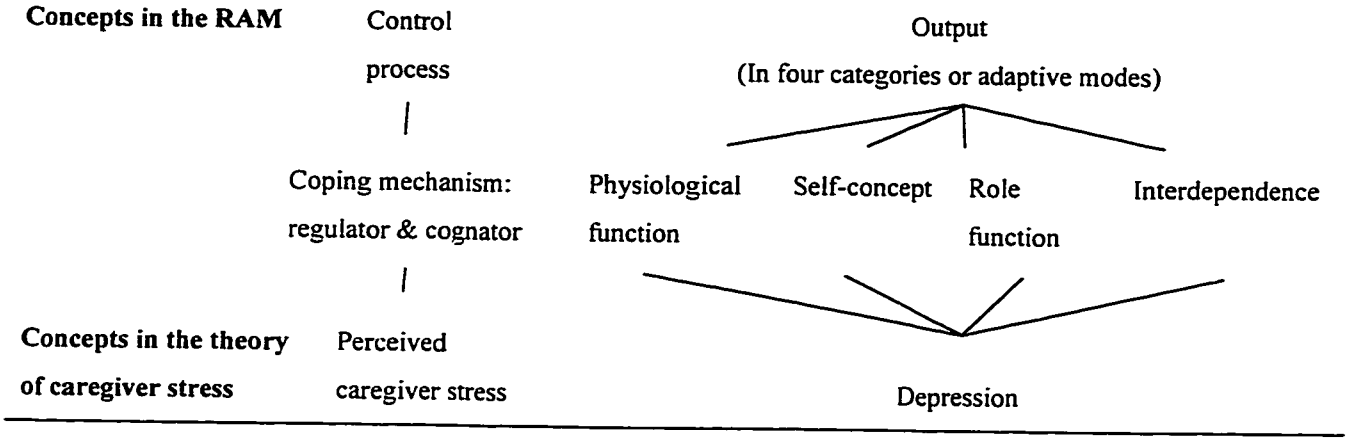
manifesting itself in four modes (Figure 1.6.[2]); or (c) depression is associated with the adaptive modes in different degrees. However, depression may not manifest itself totally in the four modes. The additional information that depression provided will be labeled psychological function in the theory of caregiver stress (Figure 1.6.[3]).

The hierarchical order of relationships among concepts by level of abstraction is shown in Table 1.2.

1. Depression is the emotional portion of cognator (coping mechanism)



2. Depression is the output which manifest itself in four modes



3. Depression is the outcome that provides additional information, namely psychological function, other than four modes

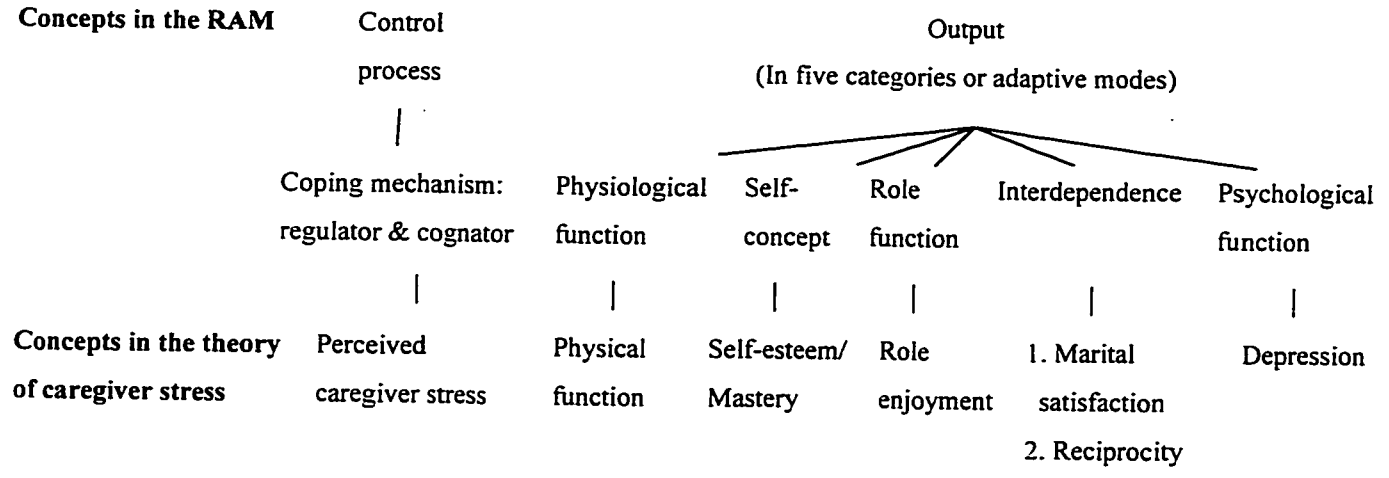


Figure 1.5. The possible location of depression in conceptual-theoretical structure.

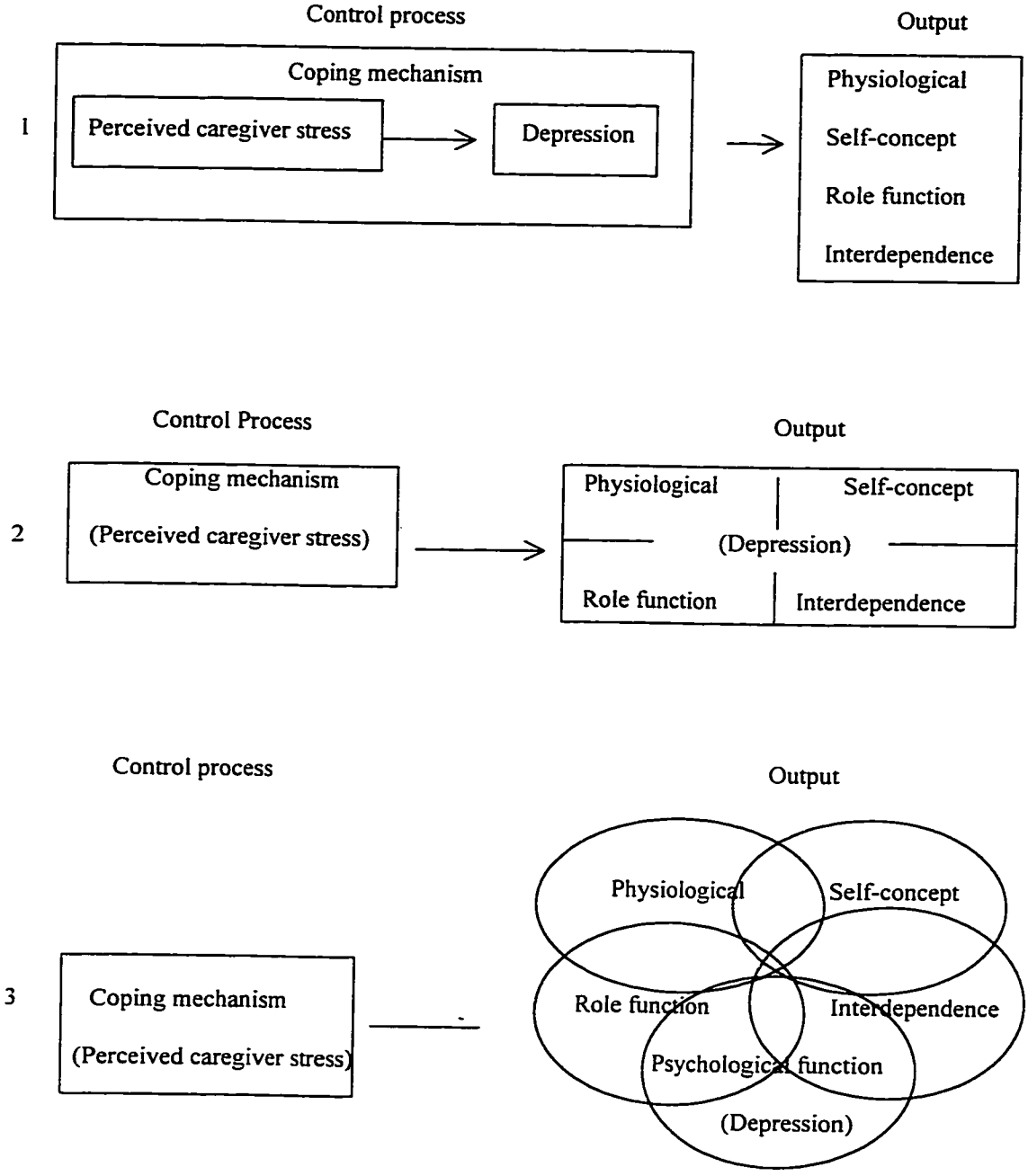


Figure 1.6. Possible relationships among perceived caregiver stress, depression and four modes.

Table 1.2.

Hierarchical Relationships Among Concepts Ordered by the Level of Abstraction

Statement in the RAM	Proposition in the Theory of Caregiver Stress
	The relationships among input (caregivers' objective burden, stressful life events, social support, social roles, race, age, gender, and relationship), and control process (perceived caregiver stress), output (physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity), and depression exist while holding constant other factors in the theory.
Focal stimuli activate coping mechanism (Andrews & Roy, 1991a)	1. Caregivers' objective burden leads to perceived caregiver stress. 2. Caregivers' objective burden is the most important stimulus leading to perceived caregiver stress.
The behaviors or responses resulting from the regulator and cognator subsystems can be observed in four categories or adaptive modes (Andrews & Roy, 1991a)	3. High perceived caregiver stress results in ineffective responses: low levels of physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity.
Modes are interrelated (Andrews & Roy, 1991a)	4. Although caregivers' physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and

Table 1.2. continued

Statement in the RAM	Proposition in the theory of caregiver stress
	reciprocity are different dimensions of caregivers' response, they are interrelated.
Contextual and residual stimuli contribute to the effect of focal stimuli on coping mechanism (Andrews & Roy, 1991a) a. Contextual and residual stimuli add to the effect of focal stimuli on coping mechanism b. Contextual and residual stimuli moderate the relationship between focal stimuli and coping mechanism	5. Stressful life events either influence perceived caregiver stress directly or buffer the relationship between objective burden and perceived caregiver stress. 6. Social support either influences perceived caregiver stress directly or buffers the relationship between objective burden and perceived caregiver stress. 7. Social roles either influence perceived caregiver stress directly or buffer the relationship between objective burden and perceived caregiver stress. 8. Race, age, gender, and relationship with the care recipient, as a group of residual stimuli, influence perceived caregiver stress.
Stimuli impact on an individual's behavior or response through coping mechanism: a. An individual's response is	9. Objective burden, stressful life events, social support, social roles, and other stimuli have no influence on caregivers' physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity in the absence of perceived caregiver stress.

Table 1.2. continued

Statement in the RAM	Proposition in the theory of caregiver stress
the function of environmental stimuli and his/her adaptation level (Andrews & Roy, 1991a). b. Behavior results from the control process (Andrews & Roy, 1991a).	
Depression is either the control process or manifests itself in four adaptive modes (Roy, 1984).	10. Depression is the emotional portion of cognator and/or the outcome of perceived caregiver stress. 10.1. Depression is the immediate outcome of perceived caregiver stress. Depression intervenes in the relationship between perceived caregiver stress and caregiver's adaptive modes: physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity. 10.2. Depression manifests itself in four adaptive modes. Adding depression (psychological function) may or may not provide additional information on caregivers' adaptation other than the four adaptive modes (physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity).

CHAPTER 2

LITERATURE REVIEW

This section reviews two bodies of literature. The first relates to the RAM. The second pertains to studies on caregiving experience.

Studies Related to Roy Adaptation Model

Studies using the RAM as the theoretical framework and those based on subjects with chronic or acute health threats are to be reviewed. First, I will review effects of stimuli, including objective burden, stressful life events, social support, social roles, race, age, gender, and relationship with the care recipient. Second, I will discuss control process. Third, the relationships among four adaptive modes will be addressed. Fourth, stress research based on the RAM will be reviewed. Finally, I will summarize the current state of knowledge related to the RAM.

Effect of Input (Stimuli) on Output (Adaptive Modes)

Most reviewed studies examined the effects of a stimulus on adaptive modes. These studies did not address whether the stimulus had direct or indirect effects on the adaptive modes.

Effect of objective burden in caregiving on adaptive modes. One study investigated caregiver burden in the chronic-illness caregiving experience (Smith, 1989). However, this study did not examine the impact of caregiver burden on adaptation. The effect of caregiver burden on adaptation has been studied in other contexts (Artinian,

1988; Smith, Moushey, Ross, & Gieffer, 1993); these studies have been included in this section. Artinian (1988) examined the effect of social support and caregiver hardship and demand on their adaptation in the context of the acute caregiving experience. Smith and her colleagues (1993) studied caregiving responsibilities and reactions of family members who provide care to a relative depending on total parenteral nutrition (TPN).

Smith (1989) examined caregivers' perception of burden and adaptation among middle-aged daughters of dependent elderly parents. The study showed that caregivers' burden remained stable over a 6-month period. No information was provided about the influence of caregiver burden on adaptive modes in the study.

Artinian (1988) considered hardship and caregiving demand as positive contextual stimuli and examined their effects on adaptation. Results indicated that hardship and demand in the caregiving situation were significant predictors of caregivers' adaptation. Hardship and caregiving demand significantly influence the caregiver's total stress response, physiologic and self-concept stress response, role function stress response, and interdependence mode stress response.

Smith and her colleagues (1993) used a semistructured interview based on the RAM to study 20 caregivers' experience with adult total parenteral nutrition dependent patients. The study showed that caregivers reported negative psychological adaptation to caregiving experience. They displayed negative feelings such as depression, strain, and difficulty watching the patient going through the illness. However, most caregivers reported stable or better physiological function. In terms of the interdependence mode, caregivers felt that friends made less contact with them. They also reported lack of communication with and help from the extended family. Regarding the caregivers' self-

concept, most felt capable and successful in their caregiving roles. In terms of role function, the responsibilities of caregivers did change in accordance with the need of the patients. Caregivers felt they needed to learn home TPN technology as well as the management of care at home. They also had less time for themselves.

Effect of stressful life events on adaptive modes. No study looked at the effect of stressful life events on an individual's adaptation. However, some studies investigated individuals who experienced a single stressful event, such as the death of a spouse (Robinson, 1991), and the presence of illness (Frederickson, Jackson, Strauman, & Strauman, 1991; Massey, 1990; Pollock, 1993). These studies are reviewed in this section.

Robinson (1991) identified the loss of a spouse as the focal stimuli in the study of widows' grief response. She did not include focal stimuli in her analysis. Instead, she looked at the effects of social support and personal resources on adaptation.

Pollock (1993) found a significant effect of health condition on physiological mode. She reported that diagnosis, duration of illness, health-related hardiness and health promotion behavior predicted physiological mode. Psychosocial adaptation was predicted by health-related hardiness, perception of disability, health promotion activity and ability to tolerate stress. Diagnosis and health condition were the predictors of physiological mode but not of psychological mode.

Studies also showed that medical diagnosis did not affect psychosocial adaptation. Massey (1990) found that diagnosis of cancer or acute health problem (cholecystectomy) was not associated with an individual's psychosocial adaptation, especially self-concept. Frederickson and her colleague (1991) also found that actual physical status was not

related to psychosocial mode.

Effect of social support on adaptive modes. One study examined social support to individuals suffering from health problems (Dobratz, 1993). Three studies looked at the impact of social support on families (Artinian, 1988; Pruden, 1991; Robinson, 1991). Social support was related to overall psychosocial adaptation. Dobratz (1993) studied the effect of social support on overall psychosocial adaptation in a group of hospice patients. She showed that social support significantly predicted psychosocial adaptation. In a study of widows, Robinson (1991) found that functional social support to widows in the second year of bereavement was inversely and weakly related to grief response.

Social support was also related to interdependence of family members, one dimension of psychosocial adaptation. Artinian (1988) showed that social support significantly related to interdependence, but it was not related to either the physiological and self-concept modes or the role function. Pruden (1991) examined the relationship between social support, loneliness, and dyadic adaptation in a sample of 35 dyads containing one member with COPD. He found that social support was negatively associated with loneliness, an inverse measure of interdependence.

Effect of social roles on adaptive modes. No study examined the effect of overall social roles on caregivers' adaptive modes. The following studies examined the role of spouse and worker, in addition to the role of patient.

The role of spouse tends to influence an individual's adaptation. Pollock (1986) examine the effect of marital status, as one of the contextual stimuli, on chronically ill patients' adaptation. Marital status was significantly associated with either psychological adaptation or physiological adaptation. However, the relationship did not articulate

further. The result did not show how marital status related to adaptation, neither did it show the degree of association.

Baker (1993) examined how the presence of a spouse affected the adaptation of stroke patients. She found that patients going through a rehabilitation program would achieve a higher level of adaptation if they had a spouse. Patients with a spouse showed a higher functioning level than patients without a spouse.

Employment also affects an individual's well-being. Tulman, Fawcett, Groblewski, and Silverman (1990) examined changes in function status after childbirth over a 6-month post-delivery period among 97 women. They showed that higher levels of functional status in household, social and community, and self-care activities were associated with higher levels of physical energy, having a vaginal delivery, and having an occupation other than that of homemaker at 3 weeks postpartum. Employment was not a significant predictor at 6 weeks, 3 months, and 6 months.

Tulman and Fawcett (1990) studied employment following childbirth. Their findings indicated that employed mothers performed more roles than non-employed mothers. The two groups were similar in terms of health and psychosocial outcomes. There were no significant differences between them in psychosocial outcome or in functional status in non-occupational areas, such as infant care responsibility, social and community participation, and self-care activities. However, there were some significant differences between employed and non-employed mothers. Mothers who were employed at 3 weeks after delivery reported greater husband participation in childcare than did those who were unemployed. Mothers employed at 3 months after delivery were more likely to feel their babies were less fussy than were unemployed mothers. At 6 months

after delivery, employed mothers were more likely to regain their energy and reported better relationships with their husbands than were unemployed mothers.

Strohmyer, Noroian, Patterson, and Carlin (1993) examined the functional and psychosocial adaptation of 18 multiple trauma patients 6 months after discharge from hospital. They reported that employment status was the best predictor of psychosocial adaptation for such patients. Employment by 6 months, a higher functional independence at discharge, and a younger age were associated with positive psychosocial adaptation.

Shuler (1990) investigated the relationships among social isolation, loneliness, self-concept, and physical and psychosocial adaptation in 65 cancer patients. Results showed that being unable to work was significantly associated with social isolation and loneliness. Patients who were unable to work due to their illness tended to be socially isolated and lonelier than those who reported that their work was not affected by their illness.

Effect of race on adaptive modes. Race is chosen to represent an individual's cultural background. The influence of race on an individual's adaptation was inconsistent across studies. Some studies showed that race was not a significant predictor of adaptive modes. For example, Calvillo and Flaskerud (1993) found that Mexican American and Anglo-American women were similar in terms of pain, self-concept, and role function. Pollock (1986) reported that no difference in physiological adaptation and psychosocial adaptation to chronic illness between Blacks and Whites. On the other hand, Fawcett and Weiss (1993) found that physiological and interdependence modes were significantly different in three cultural groups of American women--Caucasian, Hispanic, and Asian--experiencing cesarean delivery. Caucasian women had less effective response in terms of

interdependence and physiological adaptation than Hispanic and Asian women.

Effect of age on adaptive modes. Studies showed that age was related to an individual's psychosocial adaptation to certain health problems, such as cancer and multiple traumas. Dobratz (1993) reported that increasing age was related to greater psychological adaptation in a group of cancer patients. In addition, she showed that younger subjects reported more pain than older subjects. In Strohmyer et al. (1993), younger subjects were found to have higher positive psychosocial adaptation in a group of survivors of multiple traumas. However, age was not significantly related to physiological and psychosocial adaptation in a group of chronically ill patients (Pollock, 1986).

Effect of gender on adaptive modes. Most studies showed that gender had effects on both physiological and psychological adaptation. In Pollock's study (1986), gender was identified as a contextual stimulus. Results showed that gender significantly affected physiological and psychosocial adaptation. Carson (1991) also reported that gender influenced subjective stress response, heart rate, and systolic blood pressure. Although both studies showed that gender influenced an individual's physiological and psychosocial adaptation, no indication was made as to the difference between men and women in these two studies. Strohmyer et al. (1993) showed that male subjects adapted better than females. In contrast, Dobratz (1993) reported that gender was not associated with either reported pain or psychosocial adaptation.

Effect of relationship with the care recipient on adaptive modes. No study examined the effect of relationships with the care recipients on adaptive modes.

The Role of Control Process

Few studies identified control process as the mediating variable between stimuli and adaptive modes (Artinian, 1988; Carson, 1991; Frederickson et al., 1991; Massey, 1990; Pollock, 1993; Robinson, 1991). Perception was considered by most researchers as the control process. However, only two studies examined the effects of perception. Frederickson and her colleagues (1991) looked at the mediating effect of control process or perception on the relationship between actual physical status and psychosocial mode. Artinian (1988) investigated the mediating effect of control process or perception between social support, hardships and demands, and physio-psycho-social adaptation. Robinson (1991) defined control process in a different way. She operationalized the coping process as the control process and examined its relationship with contextual stimuli and with grief response among widows during their second year of bereavement. The role of perception did not appear in her study.

Frederickson and colleagues (1991) considered the perception of symptom distress as the control process in their examination of the relationship between actual physical status and the psychosocial mode. Results showed that control process (perception of symptom distress) was not a mediating variable between actual physical status (pain, shortness of breath, or urinary frequency) and psychosocial mode. Although results indicated that control process was a predictor of psychosocial mode, actual physical conditions did not significantly predict control process or perception of physical distress. Therefore, perception of physical distress did not appear to be a mediating variable between actual physical status and psychosocial mode.

Artinian (1988) examined the relationships among social support, hardship and demands, perception of illness severity, and adaptation in a caregiving process. She

showed that perception of illness severity or control process was not a mediating variable between contextual stimuli (social support or hardships and demands) and physio-psycho-social adaptation.

In Robinson's study (1991), control process was defined as the coping process. She examined the influence of coping process on widows' grief response, and investigated the influence of social support and other contextual stimuli on the coping process during the widow's second year of bereavement. Results showed that social support not only had a direct and inverse effect on widows' total adaptive response or grief response, but also an indirect effect on their grief response through the coping process. However, the effect of social support on widows' adaptive response was weak.

The Relationship Between Input (Stimuli) and the Control Process (Perception). With two exceptions (Artinian, 1988; Frederickson et al., 1991), the reviewed studies did not examine the relationship between stimuli and control process. Since perception is defined as the control process in this proposed study, studies will be included even if they did not identify perception as control process.

Only one study identified health conditions or potential health problems as the focal stimuli in relation to control process. Frederickson et al. (1991) found that actual physical status is not related to the perception of physical distress. One study looked at the relationship between contextual stimuli and the control process. Artinian (1988) found that neither social support nor hardships and demands, as contextual stimuli, were associated with the perception of illness severity.

Fawcett and Weiss (1993) identified perception as the overall adaptation instead of the control process. They investigated the relation between cognator effectiveness and

perception. Results showed that receiving information had no impact on perception of birth among women undergoing cesarean birth.

The relationship between the control process (perception) and adaptive modes. Several studies investigated the relationship between control process and physiological adaptation. Pollock (1993) found that the perceived level of disability significantly predicted the physiological function mode among patients with either multiple sclerosis or rheumatoid arthritis, but not among patients with diabetes mellitus or hypertension. Carson (1991) indicated that there was no relationship between perception of control over life events and physiological mode, cortisol level, heart rate, and blood pressure. The different findings could be attributed to the difference in the operational definition of control process. The control process or perception, in Carson's study, was not event-specific perception, whereas Pollock used event-specific perception. In the RAM, perception within control process is the appraisal process of environmental stimuli. Carson's definition of control process was a general appraisal of personal ability rather than the appraisal of specific environmental stimuli. Specifically, the physiological stress in Carson's study was a short period, 90-second test. It is possible that the stimulus was not long enough to simulate change in the general perception of control over life events.

Although Artinian (1988) examined the relationship between perception and the physiological mode, she did not provide conclusive evidence for the relationship between perception and the physiological modes. The problem was in her use of a strain questionnaire to measure both physiological mode and self-concept. Results showed that perception was not related to the overall score on the strain questionnaire. No further information was provided about the relationship between perception and physiological

mode or self-concept. Therefore, control process or perception needs to be event-specific, and the measure of adaptive modes needs to be separated.

The relationship between control process and the combined measure of psychosocial adaptation is more consistent than the relationship between control process and the separated measure of psychosocial adaptation (role function, self-concept, and interdependence). Three studies looked at the combined measure of psychosocial adaptation. Two studies used event-specific perception (Frederickson et al., 1991; Pollock, 1993) whereas one used general perception (Carson, 1991). Results of the studies using event-specific perception showed a significant relationship between control process and the psychosocial adaptation, but the relationship did not exist in the studies using general perception. Pollock (1993) found that the perceived level of disability was significantly associated with psychosocial adaptation in four groups of chronically ill patients. Findings from Frederickson et al. (1991) showed that perception of physical distress was significantly related to psychosocial adaptation. On the other hand, Carson (1991) showed no association between perception of control over life events and psychosocial adaptation.

When examining the relationship between control process and separated measures of psychosocial adaptation, the results were more diverse than those for the combined measure of psychosocial adaptation. Massey's (1990) study indicated that there was a significant relationship between perception influenced by hardiness and self-concept. The study of Artinian (1988) showed that perception of illness severity was associated with interdependence. On the other hands, Artinian (1991) showed no relationship between perception of illness severity and role function.

The Relationship Among Adaptive Modes

The relationships among adaptive modes are inconsistent across studies. Physiological adaptation is significantly related to psychosocial adaptation among patients with chronic illness, such as diabetes and arthritis (Pollock, 1986, 1993). On the other hands, pain and physical function are unrelated to psychological adaptation among dying patients or cancer patients (Dobratz, 1993; Frederickson et al., 1991).

Few studies examined the relationships among modes using separated measures of psychosocial mode. Christian's (1992) study showed that the number, frequency, and severity of symptoms of endometriosis were not related to self-concept. In contrast, Calvillo and her colleagues (1993) found that pain was significantly related to self-concept in a group of patients undergoing elective cholecystectomy. The same study also found that pain was not related to two other psychosocial modes, role function and interdependence.

Research Related to Stress

Stress tends to be labeled as a stimulus instead of a mediating variable between stimuli and control process or between stimuli and modes. Carson (1991) showed that the current stress level was not related to physiological adaptation, but significantly related to psychosocial adaptation. Pollock's (1989) study examined the effects of both outcome stress appraisal and anticipatory stress appraisal on physiological adaptation among DM patients. She showed that outcome stress appraisals were related to physiological adaptation, but anticipatory stress appraisals were not statistically related to physiological adaptation.

Preston and Dellasega (1990) explored the moderating effect of gender and marital status on the relationship between stress and physiopsychological health outcomes in the elderly. Their study discussed the application of results based on the RAM. The results showed that high stress was predictive of poor health for all subjects. However, by looking at the effect of gender and marital status on stress/health relationship, they found that married women experienced the poorest health and the highest stress.

Conclusion of the State of Knowledge Related to the RAM and Future Direction

With few exceptions, studies looked at the total effect of a stimulus on adaptation. Many researchers used health threat or health condition as the predictor or stimulus in their studies. Few studies examined the influence of race, age, and gender on adaptation. None of the research examined the impact of the relationship with the care recipient.

The effect of objective burden on adaptation in the context of chronic caregiving cannot be concluded, because research did not provide such information. Other studies that examined caregivers' experience showed that caregivers reported ineffective psychological adaptive response to chronic caregiving. Demands and hardship predicted caregivers' adaptation in the context of acute caregiving.

None of the studies examined the impact of stressful life events. A single life event--such as the presence of disease, diagnosis and health condition--were predictors of physiological mode, but not of psychological mode. Although one study identified the death of a spouse as a focal stimulus, but it did not examine the impact on adaptation.

Four studies investigated the impact of social support as a stimulus. Results

showed that social support was a significant predictor of psychosocial adaptation for dying patients and a predictor of interdependence for family. One study examined the association between social support and physiological adaptation. The result indicated that social support did not predict physiological adaptation.

None of the reviewed studies looked at the impact of all other social roles on adaptation. The effect of a single social role, such as spouse and worker, on adaptation was evidenced. Being a spouse was predictive of both psychosocial adaptation and physiological adaptation among chronic illness patients. Employment was also associated with better physiological and psychosocial adaptation in women after childbirth, and it predicted psychosocial adaptation in multiple trauma and cancer patients.

Other residual stimuli, such as race, age, and gender, have different effects on caregivers' adaptation. The effects of race on adaptation were inconclusive. Age was related to an individual's psychosocial adaptation to health problem, such as cancer and multiple traumas. Most studies showed that gender affected a person's physiological and psychosocial adaptation. The influence of the relationship with the care recipient on an individual's adaptation has not been studied.

Although six studies identified the control process as a mediating variable between stimuli and adaptive modes, only three studies investigated the effect of control process. Two studies used perception as the control process. They showed that control process, perception, was not a mediating variable between environmental stimuli and adaptive modes. Environmental stimuli seemed unrelated to the control process or perception. It is interesting to note that event-specific or stimulus-specific perception was related to physiological adaptation and the combined measure of psychosocial adaptation.

On the other hand, a more generally defined control process was not related to physiological mode and the combined measure of psychosocial adaptation. Compared with the relationship between control process and the combined measures of psychosocial adaptation, the relationship between control process and separated measures of psychosocial modes (role function, self-concept, and interdependence) was inconsistent, even though the studies all used event-specific or stimuli-specific control process.

The relationships among adaptive modes seemed to differ by the study population. For patients with chronic illness, physiological adaptation was significant related to the combined measure of psychosocial adaptation. For dying patients or cancer patients, physiological adaptation and the combined measures of psychosocial adaptation were not correlated.

Only two studies investigated the role of stress as a stimulus using the RAM. The effect of stress on psychosocial adaptation was significant in one study. The effect of stress on physiological adaptation was inconclusive because two studies presented opposite results. Marital status and gender seemed to moderate the stress/health relationship.

Three studies examined the caregiving experience. Only one study examined the caregiving experience with chronically ill patients. The problems with these studies were: (a) The majority of the subjects were Whites, thus ignoring the caregiving experience in other ethnic groups; (b) Studies used small, convenient samples, thus limiting the generalizability of their results; (c) No study addressed the experience of aged caregivers.

Literature Review Related to the Caregiving Experience

Since few studies used the RAM as the theoretical framework to investigate the caregiving experience, the following literature will expand our understanding of the relationship among variables related to the caregiving experience. Studies reviewed in this section include those that investigated: (a) the effects of focal stimuli, objective burden in caregiving; (b) the effect of contextual stimuli, including stressful life events, social support, and social roles; (c) the effect of residual stimuli, including race, age, gender, and relationship with the care recipient; (d) the role of cognitive appraisal or perception; and (e) the outcome of caregiving experience with chronically ill patients.

Effects of Focal Stimuli (Objective Burden in Caregiving)

Chronically ill elders place tremendous burdens on the family members who assume primary responsibility for caregiving. This section focuses on the objective burden of caregiving.

Max, Webber, and Fox (1995) observed that informal caregivers suffered from economic burden, such as the hours spent assessing Alzheimer's disease (AD) patients and financial cost. Their study showed that caregivers provided an average 286 hours per month of unpaid care at a cost of $34,517 per year. They argued that the hours spent assessing AD patients with daily activities and supervising them could have been spent in alternative activities, such as paid employment or leisure time. Therefore, from an economic viewpoint, caring for AD patients must account for the social costs of the disease, such as economic burden, in order to estimate accurately its total burden.

White-Means (1993) provided the evidence that Black caregivers with greater

hours in care were significantly more likely to have limited free time. Some caregivers quit their jobs because of the demands of caregiving. The number of hours of caregiving varied according to the relationship with the care recipient and the type of care provided. Unmarried, more educated caregivers, and those living with the care recipients, tended to provide more care than their counterparts Spouse caregivers were also found to provide more hours of help than other groups of caregivers.

Care arrangement. The caregivers who provide more direct care seem to experience more stress. Rankin, Haut, and Keefover (1992) reported that direct caregiving predicted a significant portion of variance in the caregiver's global stress. Providing direct care also influences the outcome of caregivers. The more direct care the caregiver provides, the higher the level of impact on their well-being (Rankin et al., 1992).

Hours of care. Time spent on caregiving has partial impact on the caregiver's well-being. Lieberman and Fisher (1995) reported that hours of care were significantly related to caregivers' anxiety/depression and somatic symptoms. Caregivers who provided more hours of care showed higher levels of anxiety, depression, and more somatic symptoms. White-Means (1993) reported that caregivers' hours of care significantly affected their emotional and physical strain. Mui (1995b) reported that the demands of the caregiving role, measured by the time spent on caregiving and the total number of ADL and IADL tasks provided, were not related to the caregiver's perceived health and functional status.

Effects of Contextual Stimuli

Stressful life events. The relationship between stressful life events and well-being seems ambiguous. On one hand, studies have showed that life events affect an individual's well-being. For example, stressful life events were associated with psychological symptoms, but the patterns of association varied with the type of symptom (Byrne, 1984). The effects of stressful life events were associated with psychological impairment in a survey of a representative sample in an Australian suburban area (Andrews, Tennant, Hewson & Vaillant, 1978). The same findings were obtained by the study of Crandall, Preisler, and Aussprung (1992): Stressful life events were positively associated with physical symptoms and negatively associated with mood in a group of college students. On the other hand, some researchers argued that the association between stressful life events and well-being was due to the confounding of stressful life events with health-related events, neuroticism-related events, and subjective events (Schroeder & Costa, 1984). Other studies showed that stressful life events were independently related to physical health (Tennant Langeludecke, Fulcher & Wilby, 1988). Turner and Avison (1992) further proposed that stressful life events represented opportunities as well as hazards. Their results showed that life events that have been resolved successfully do not lead to an individual's stress.

Social support. Social support has a main and moderating effect on health outcomes. The underlying assumption is that social support is always positive and beneficial (Antonucci & Depner, 1982). Two models have been proposed to explain the effect of social support on health outcomes. The main effect model posits that high levels of social support promote health regardless of the level of stress (House, 1981; Thoits,

1983a). Kaplan and Toshima (1990), for example, reported that social support improved personal health outcomes and reduced mortality. The stress buffering model suggests that stress has greater adverse effects on health when social support is lower (Cohen & Wells, 1985; Thoits, 1982; Turner, 1981). The former explains the main effect of social support on health outcome, whereas the latter describes the interactive effect between stress and social support.

In the context of caregiving, social support has been conceptualized as a moderator in the stress process (George, 1980; House, 1974; Pearlin, 1989; Pearlin, Lieberman, Menaghan, & Mullan, 1981; Pearlin, Mullan, Sample & Skaff, 1990). The buffering model proposes that social support could protect people from harmful environmental threats (Stewart, 1993). For example, Okun, Sandler, and Baumann (1988) reported that social support might buffer the impact of stressful life events and boost the beneficial effects of positive life events. Social support has also been viewed as a coping resource that conditions the negative effects of stressful events (Sarason & Sarason, 1985). The moderating effect of social support may operate through enhancing the ability of the individual or changing the cognitive appraisal of the events or their outcomes (Cohen & Wills, 1985).

Social support is related to caregiver stress. Mui and Morrow-Howell (1993) showed that, among four sets of predictor variables, the unavailability of respite support and perceived conflict in personal and social life were both important for understanding the impact of spouse and sibling caregivers' role strain.

Social support has been identified as a predictor of caregiver well-being. Quayhagen and Quayhagen (1988) found that social support was associated with three

measures of caregiver well-being. Caregivers who reported needing more social support had lower well-being than those caregivers who did not need more social support.

Social roles. Caregivers often have more than one role. In a national survey, Adelmann (1994) found that people occupied, on an average, 3.33 out of 8 possible roles. Women reported more roles than did men; and White people reported more roles than did Black. Caregivers with at least one other social role, such as paid worker, parent, or spouse, had better physical and mental well-being (Okun, Stock, Haring, & Witter, 1984; Rushing, Ritter, & Burton; 1992; Verbrugge, 1983). Better physical health among adults was associated with more roles (Adelmann, 1994; Rushing et al., 1992; Verbrugge, 1987). In terms of psychosocial well-being, Skaff and Pearlin (1992) reported that limited social contact and lack of social roles outside that of caregiver were related to greater loss of self, one dimension of self-concept. People with more roles tended to insulate themselves from self-loss, with one exception. Caregivers who were not married, were unemployed, and had no children seemed to experience higher levels of self-loss than other groups of caregivers.

The interaction of the number of social roles and gender has significant impact on caregiver well-being. For example, Mui (1995b) reported that other competing demands, measured by the number of social roles, were significantly related to the caregiver's perceived health among husband caregivers. For wife caregivers, this relationship was not significant. Further, Adelmann (1994) reported that health rating was significantly associated with multiple roles for both men and women, but the coefficient for men was more than twice that for women. For women, doctor visits were negatively associated with roles. This relationship was five times as large as that for men. The interaction of

social roles and age also affected the caregiver's well-being. This was discussed in the age section.

Although caregivers could have multiple roles, other roles are unlikely to decrease the likelihood of becoming a caregiver. Caregivers may also care for more than one person. Robison, Moen, and Dempster-McClain (1995) found that women born in the late 1920s and early 1930s reported more episodes of caring for frail elders, disabled children, and for more than one person at a time than women born prior to 1926. The study also showed that employment did not seem to decrease but was positively related to the likelihood of caregiving. The number of other roles and the numbers of years women spent in particular roles (working, volunteering, marriage, or child raising) were not related to the chance of taking on the caregiving role. No study reported the competing demand between two caregiver roles.

Effects of Residual Stimuli

Race. Race is an indicator of culture. Culture shapes an individual's commitment and beliefs. The same environmental event may be categorized or constructed differently for people with distinct cultural backgrounds. The cognitive approach to stress is based on the assumption that variation in the response to stress is determined by an individual's cognitive appraisal (Potashnik, 1988). Factors such as belief, value, and commitment, that are shaped by culture and life experience, can influence an individual's cognitive appraisal (Lazarus & Delongis, 1983). Commitment and belief about the self and the world are particularly important to stress appraisal. An environmental event tends to be appraised as a threat when the event threatens important personal commitments or beliefs.

Research in general indicates racial differences in the amount of burden experienced by caregivers. Lawton, Rajagopal, Brody and Kleban (1992) reported that Black caregivers showed less depression than White caregivers. The different levels of depression experienced by Black and White caregivers might result from the different levels of subjective burden, stress, or strain experienced. Mui (1992) reported that Black daughters had less role strain than their White counterparts. Hinrichsen and Ramirez (1992) showed that Black caregivers experienced less burden than did White. After controlling for background and socioeconomic variables, caregiving appraisal was still different between Black and White caregivers; Black caregivers demonstrated less subjective burden, greater satisfaction, and less perceived intrusion (Lawton et al., 1992).

The predictors of burden for Black and White caregivers are different. In Mui's (1992) study, the common predictor of role strain in the two groups was conflict in life. The unique predictors for Whites included poor quality relationships and work conflict. For Black women, poor perceived health, unavailability of respite support, and lower caregiving role demand predicted a higher level of role strain. To predict the caregiver's subjective burden, Lawton and his colleagues (1992) showed that the caregiver's perceived health and the help given by the caregiver were the common predictors in two groups. In addition, more severe symptoms in the impaired elderly were related directly to greater subjective burden among White caregivers.

Age. Age may influence perception indirectly through shaping personality. In general, personality is a relatively stable trait. Costa and McCrae (1980) investigated the relationship between personality and subjective well-being in a series of studies. They found that personality hardly changed over time. Results also showed that earlier

personality traits predicted current subjective well-being, happiness, or unhappiness. However, looking at specific dimensions of personality, studies showed that age changed how people viewed things. For example, Neugarten and Weinstein (1964) found that adaptation process, coping style, life satisfaction, and strength of goal-oriented behavior, remained stable over a 10-year span. However, their results also showed that men changed from active mastery to passive mastery through the years. Men felt they were their own master and that they could control their own lives by age 40. They viewed risk-taking in a more positive way. Men at age 60, on the other hand, tended to accommodate passively to outside environments and to view environmental change as threatening. Their attitude to change was more conservative than younger men. These findings were indirectly confirmed by the study of Haan, Millsap and Hartka (1986). It is reasonable to believe that younger people feel more in control and are more active in their lives. Haan et al. (1986) showed that all dimensions of personality positively progress over time, except the assertive-submissive dimension (degrees of direct and aggressive style of living). Aldwin (1991) also showed that older adults perceived less control over their environments than younger groups. The path model showed that older adults tended to claim less responsibility to themselves, reported less escapism, but tended to use similar instrumental action. Younger adults had more locus of control than older caregivers. They claimed more responsibility for managing their problems. In the context of dementia caregiving, Fitting et al. (1986) reported that younger caregivers had higher levels of distress than older caregivers. One possible explanation is that younger caregivers tend to believe they are in control of things and, therefore, have higher expectations than older caregivers. Such high expectations will be easily translated to stress when they realize

that dementia is deteriorative. For example, in the Fitting Rabin, Lucas and Eastham's study (1986), one younger caregiver stated that she felt devastated when she realized that dementia was an irreversible health problem. Similar findings were supported by Barusch and Spaid (1989). They interviewed 131 caregivers and found that younger caregivers expressed more subjective burden than older caregivers.

The difference in mastery of life between younger and older adults may also be explained by their life experience. In general, older people are more adaptive to difficulty. Aldwin (1991) explained that older adults have had more exposure to a variety of problems. This gave them more opportunities to learn and practice coping strategies.

It is also possible that younger caregivers have more social roles than older caregivers which creates more role strain for them. Role strain is common among adult children caregivers. Parenting care, child care, family responsibility, and employment may conflict (Brody, 1985; George & Gwyther, 1986a; Young & Kahana, 1989). Fitting et al. (1986) reported that younger caregivers needed more psychological support because they performed several social roles in addition to caregiving.

Although younger caregivers perceived more strain than older caregivers, older caregivers reported more restricted social life than younger caregivers after controlling other context and social support variables (Thompson, Futterman, Gallagher-Thompson, Rose & Lovett, 1993). It is possible that older caregivers tend to be the primary caregivers and shoulder more caregiving responsibilities than younger caregivers. As such, the role of caregiver leads to restriction of their social life.

Gender. Female caregivers seem to suffer more emotional distress than male caregivers. Mui (1995b) reported that daughter caregivers showed higher levels of

emotional strain than did sons. Wife caregivers also reported higher levels of caregiver strain than did husband caregivers (Mui, 1995a). Barusch and Spaid (1989), Fitting et al. (1986), and Thompson et al. (1993) showed that female caregivers were more distressed than male caregivers. Zarit, Todd and Zarit (1986) indicated that wife caregivers reported higher distress than husband caregivers, but that the differences disappeared in the long run.

Caregiving experience results in poorer health among female caregivers as compared to their male counterparts. Williamson and Schulz (1993) reported that depression scores were significantly higher among female caregivers than male caregivers. Allen (1994) also reported that women showed more mental health symptoms than men. Lieberman and Fisher (1995) reported that female offspring had higher anxiety/depression than male offspring. Female caregivers also showed poorer psychosocial well-being than their male counterparts. This is probably due to the gender difference in the relationships between caregivers and their family. This is evidenced in the studies of Fitting et al. (1986) and Thompson et al. (1993). Fitting et al. (1986) found that 25% of the husbands reported an improved relationship with their spouses since assuming the caregiver role; while wives reported deterioration in their marital relationships. Thompson et al. (1993) reported that female caregivers were more likely to report that caregiving responsibility influenced their relationships with the care recipients. In terms of perceived health, Mui (1995a) reported wife caregivers showed poorer perceived health than did husbands. However, the difference was small after controlling other factors. Lieberman and Fisher (1995) found the interaction among gender, hours of care, and somatic symptoms. The study showed that the association between hours of

care and somatic symptoms was greater for female offspring than for male offspring. In terms of role function, women reported more role conflict than men (Allen, 1994). Whether female caregivers incurred more adverse physical health outcome than male caregivers is not clear. Mui (1995a) reported that there was no difference in functional status between husband and wife caregivers. Allen (1994) reported that women showed greater physical health decline than men did.

Gender difference may influence how caregivers perceived stressful caregiving events. Quayhagen and Quayhagen (1988) found that three caregiver groups (male spouses, female spouses, and offspring) differed in the type of behaviors they found stressful. Female spouse caregivers were more stressed by the husbands' embarrassing acts and dangerous behaviors than the other two groups. Their parents' inability to bathe themselves or to stay home alone were frequently identified as stressful by adult children caregivers. Mui (1995a) examined the impact of factors on perceived strain among adult son and daughter caregivers of frail elderly parents. She found that perceived interference between caregiving and the caregiver's personal and social life influenced both daughter and son caregivers' strain. The study also reported that the most important predictors of emotional strain for daughter caregivers were interference with work and quality of relationship with the parent. For sons, the most important predictors were the parent's behavioral problems and lack of informal helpers.

Studies showed that men and women provided different types of help to the frail elderly (Horowitz, 1985; Miller & Cafasso, 1992; Young & Kahana, 1989). Women tended to help with cooking, laundry, shopping, and personal care. Men tended to help with home repairs and household chores. For example, studying a group of caregivers

whose spouses were undergoing cancer outpatient treatment, Allen (1994) showed that husband caregivers were less likely than wife caregivers to help their sick spouses with household tasks.

Men are less involved in caregiving than are women (Finley, 1989; Horowitz, 1985). Although females perceive more role conflicts than males, female caregivers are more involved in caregiving than male caregivers (Finley, 1989). The attitude of filial obligation does not seem to differ between female and male caregivers in the elderly caregiving situation. However, there is a discrepancy between the male caregiver's filial attitude and behavior. Male caregivers expressed the same filial attitude toward caregiving as female caregivers, but they did not actually fulfill this responsibility as the female caregivers did (Finley, 1989). Female caregivers tended to take the primary caregiver role whereas men tended to be the secondary caregiver (Tennstedt, McKinlay, & Sullivan, 1988).

Women invest more time than men in care provision. Young and Kahana (1989) reported that female caregivers provided more aids than male caregivers. Allen (1994) showed that wife spouse caregivers provided twice the hours of care that husbands provided. Stroller (1983) also found that daughter caregivers provided a larger number of hours of assistance to their parents than did sons.

Relationship with the care recipient. Whether spouse caregivers experience higher degrees of stress than nonspouse caregivers (for example, adult child caregivers) is not clear. Rankin, Haut, and Keefover (1992) reported that types of relationships between caregivers and care recipients were not significantly related to caregiver burden. On the other hand, Young and Kahana (1989) reported that daughters showed significantly

higher burden than spouse caregivers.

George and Gwyther (1986b) reported that spouse caregivers reported poorer physical health and psychosocial well-being than the other two groups of caregivers. Spouse caregivers tended to have more doctor visit and poorer self-rated health. Spouse caregivers also reported more stress symptoms and were more likely to use psychotropic drugs. In addition, spouse caregivers had a lower level of affect balance and life satisfaction. On the other hand, Thompson et al. (1993) stated that spouse caregivers did not report more adverse caregiving outcome than nonspouse caregivers. Spouse caregivers showed no evidence of burden, restricted social life, and negative impact on the dyad relationship or negative interaction with family/friends because of caregiving responsibility. In contrast, adult child caregivers were more likely to report a restricted social life because of caregiving responsibilities than nonadult child caregivers (Thompson et al., 1993).

Spouse caregivers were significantly older than adult child caregivers (George and Gwyther, 1986a). To test whether the difference between spouse and adult child caregivers simply reflected the effect of age, George and Gwyther (1986b) examined the effect of relationship controlling for age. They found that spouse caregivers exhibited poorer physical health and psychosocial well-being, holding age constant.

Since older caregivers tend to be the patients' spouses whereas younger caregivers may be the patients' adult children, how social norms impinge upon caregivers also needs to be considered when examining the effect of age and relationship. Spouse caregivers often view caregiving to their spouses as a responsibility of marriage. They tend to commit more than children caregivers (Troll, Miller, & Atchley, 1979). Since spouses

view caregiving as normative, they may accept the role easily. On the other hand, children assume the caregiver role when spouse caregivers are not available (Lopata, 1973; Stoller & Earl, 1983; Townsend, Noelker, Diemling, & Bass, 1988). Since children do not naturally expect to take the role of caregivers, they may feel resentful and stressed.

Spouse caregivers and adult children caregivers may assume different roles in the caregiving process. Young and Kahana (1989) reported that two groups of caregivers, spouses and daughters, provided the same amount of aid. However, the types of aid they provided were different. Spouse caregivers tended to help with cooking and housekeeping. Daughters were more likely to help with personal care, toileting, and transportation.

The Role of Cognitive Appraisal or Perception

Perception or cognitive appraisal is important in understanding personal psychological responses to stress (Lazarus, 1966). According to Lazarus (1978), cognitive appraisal is a constantly changing set of judgments about the significance of environmental events for the person's well-being and about the availability of coping resources. Cognitive appraisal is a subjective evaluation of the meaning of environmental events, of their relevance to the individual, and of available coping resources or options. It is an assessment of environmental encounters at a specific time to see how the encounters are related to the individual, in which way, and at what level. The second level of cognitive appraisal considers which coping resources are available, how well the coping options will accomplish their goals, and how well the individual can apply a strategy or a set of strategies effectively.

Subjective perception can be used interchangeably with cognitive appraisal. For example, subjective perception is defined as the process in which an individual evaluates the meaning of an environment and how it relates to that individual. From this viewpoint, subjective appraisal and cognitive appraisal are interchangeable (Potashnik, 1988). Perception or cognitive appraisal is particularly important in the context of caregiving.

The importance of cognitive appraisal or perception is in its effects on the adaptation outcome. For example, studies have reported that perceived strain affects the caregiver's physical well-being. Kiecolt-Glaser and her colleagues (1987) showed that caregivers had significantly poorer immune functions, indicated by lower percentages of total T lymphocytes and helper T lymphocytes, and lower helper-suppressor cell ratios, than did the comparison subjects. Caregivers also had significantly higher antibody titers for Epstein-Bar virus than did comparison subjects, presumably reflecting poorer cellular immune system control of latent virus among caregivers. Perceived stress also influences the caregiver's physical function. Defining emotional strain as the subjective evaluation of the amount of emotional strain caused by caring for a frail elderly spouse, Mui (1995a) showed that the caregiver's emotional strain was the strongest predictor of functional limitation.

Caregivers' subjective appraisal stress is also related to their psychosocial well-being. It was evidenced in the studies of Lawton and colleagues (1991), Mui (1995b), and Rankin et al. (1992). Lawton and colleagues (1991) reported that caregiving burden, defined as subjective appraisal stress, was significantly related to caregivers' depression. Rankin et al. (1992) found that caregivers who experienced higher levels of stress showed more depressive symptoms and were less satisfied with their family's cohesion and

adaptability. Mui (1995b) reported that emotional strain was the strongest predictor of poor perceived health among caregivers.

Associations between age, internal environmental stimuli, and depression are intervened by cognitive appraisal and coping processes. Younger adults tended to have higher stress than older adults. Stress was positively related to depression. Path models have shown that younger adults used more escapism, had higher perceived stress, and were less able to cope with health problems (Aldwin, 1991). As to the mediating effect of stress, Aldwin (1991) showed that age had an indirect effect on depression through its influence on perceived stress, coping process, and perceived efficacy.

In the context of dementia caregiving, cognitive appraisal mediates the relationship between patient characteristics, demand and social support, and adaptation. Lawton et al. (1991) used caregiving burden as the cognitive and affective response to the demand of caregiving in a study of 529 children and spouse caregivers. The result showed that the caregiving burden mediated the relations between the care recipient's symptoms, help received by the caregiver, and the caregiver's depression. That is, the significant relationships between care recipient characteristics and help received by the caregiver, and the caregiver's depression disappeared in the absence of the caregiver's perceived burden.

The Outcome of Caregiving Experience with Chronically ill patients

There has been an increase in life expectancy and the aged population during this century. There has also been a shift in the pattern of disease from acute to chronic illness. As a consequence, the number of people with limitations in functional activity and

morbidity escalate. Family members provide most of the care to those who have become dependent due to chronic physical and/or mental illnesses. According to Stone, Cafferata, and Sangl (1987), family members provide 70% to 80% of the long-term care for frail elderly people. Many family members experience increased physical and psychological burden that affect their own health and well-being. The following section will discuss the physiological and psychosocial impact of caregiving a chronically ill family member on caregivers.

Physiological function. Findings on the relationship between caregiving and the caregiver's health outcomes are inconsistent. Haley, Levine, Brown, Berry and Hughes (1987) used a convenience sample of 44 primary caregivers of senile dementia patients and 44 matched controls in their cross-sectional study. They found that caregivers had lower health status than the comparison group. Caregivers reported more chronic illnesses, more health care utilization, and more prescriptions used. On the other hand, George and Gwyther (1986a) found that caregivers of memory-impaired patients showed similar physical health consequences. Caregivers did not report using more medical services than random community samples.

Using self-rated health indicators, Haley and his colleagues (1987) found that caregivers reported lower health status than controls. On the other hand, George and Gwyther (1986) showed that there was no evidence that caregivers rated their physical health less satisfactorily than the general population.

Self-concept. self-esteem and mastery, as the self-concept mode, were used in most of the caregiving studies as predictors or the conditioning variables of caregivng outcomes. Studies showed a significant relationship between self-esteem and mastery and

the caregiver's well-being. For example, Braithwaite (1996) found that minor psychiatric symptoms among caregivers were partly explained by their caregivers' burden, workload, physical health, self-esteem, mastery, coping strategies, and social support. Clair, Fitzpatrick, and La Gory (1995) reported that burden and depression were significantly influenced by the inner resourcefulness or mastery of the caregiver. Talkington-Boyer and Snyder (1994) found that the caregiver's subjective burden, negative impact, satisfaction, and mastery were correlated with both the patient's memory and behavior problems and with the caregiver's coping style, locus of control, self-esteem, ego strength, level of depression, and perceived support. Miller, Campball, Farran, Kaufman, and Davis (1995) reported that the caregiver's mastery moderated the effects of stressors on depression and was the only significant psychological resource predicting role strain. Skaff and Pearlin (1992) reported that loss of self, one dimension of self-concept, was associated with lower self-esteem and mastery and with greater depressive symptomatology. Overall, these studies suggested that self-concept modes, such as mastery and self-esteem, were associated with the caregiver's depression and burden.

Role function. Changes in personal life or activities due to long-term caregiving could incur role strain among caregivers. Based on a national sample, Mui and Morrow-Howell (1993) examined the relationship between role strain and caregiving experience. The dependent variable, role strain, was defined as the felt difficulty in fulfilling role obligations. Among four sets of predictor variables, the unavailability of respite support and perceived conflict in personal and social life were both important for understanding the impact on spouse and sibling caregivers' role strain.

Interdependence. Caregivers often reported a change in interpersonal

relationships. Chenoweth and Spencer (1986) examined the experience of caring for a demented patient among 289 family caregivers randomly sampled from the mailing list of the Minnesota Chapter of the Alzheimer's Disease and Related Disorders Association (ADRDA). Their results showed that family members varied in their ability to accept the consequences of dementia. Sometimes the primary caregiver was resented by other family members who could not accept the problem. In some cases the tension resulted in the destruction and disintegration of the family. When asked whether their relative's disease affected their relationships with other people, most caregivers said it had. Caregiving experience seems not only to affect the interpersonal relationships of caregivers, but it also influences their relationship with the care recipients. The study of Haley and his colleagues (1987) indicated that caregivers showed significantly more negative affect toward their demented relatives than did controls.

Depression or Psychological Well-being.

Caregiving experience impacts the caregiver's psychosocial well-being. For example, Cohen and Eisdorfer's (1988) cross-sectional study found that 55% of major caregivers experienced depression. Research also showed that caregivers experienced poorer psychosocial well-being than the general population. Williamson and Schulz (1993) showed that 31.4% of the caregivers in their study scored 16 or higher on the CES-D score. The mean score was substantially higher than that of the general population. Dura, Haywood-Niler, and Kiecolt-Glaser (1990) also reported that caregivers of patients with Alzheimer's or Parkinson's disease reported higher levels of depression than the control group. George and Gwyther (1986b) showed that caregivers

had more psychological symptoms, lower affect balance, lower life satisfaction, and used more psychotropic drugs than the control group. Haley and his colleagues (1987) found that caregivers had lower psychosocial well-being than subjects in the control group.

Conclusion of the State of Knowledge Related to the Caregiving Experience

Caregiving seems to relate to caregivers' psychosocial well-being. The relationship between caregiving and physiological well-being is inconclusive. Findings on the relationship between caregiving and the caregiver's physical health outcome are inconsistent across studies. On the other hand, studies have shown that the caregiving experience affected the caregiver's psychosocial well-being. Self-esteem and mastery, the self-concept mode, were used frequently in predicting or conditioning caregiving outcomes. Studies showed a significant relationship between self-esteem and mastery and the caregiver's well-being. Studies also suggested that mastery and self-esteem were associated with the caregiver's depression and burden. Changes in personal life or activities due to long-term caregiving could incur role strain, representing role function mode, among caregivers. Unavailability of respite support and perceived conflict in personal and social life were the most important predictors in understanding caregiver's role strain. With regard to the independence mode, caregivers often reported change in interpersonal relationships.

The importance of cognitive appraisal or perception was its effects on the adaptation outcome. Perceived strain affected the caregivers' physical well-being as well as their psychosocial well-being. Cognitive appraisal and coping processes mediated and/or moderated the effects of caregiving on the well-being of caregivers.

In terms of the objective burden of caregiving, caregivers who provide more direct care activities seem to experience more burdens. Time spent on caregiving had partial impact on the caregiver's well-being.

Other possible factors which possibly influence caregiver stress include stressful life events, social support, social roles, race, age, gender, and relationship with the care recipient. The effect of a stressful life on well-being proved inconsistent. High levels of stress were associated with less social support, and evident in were White, younger, and female caregivers. It was unclear whether spouse caregivers experience higher degrees of stress than nonspouse caregivers, for example, adult child caregivers. Caregivers' social roles, influence their physical and mental well-being. However, the direction is inconclusive.

CHAPTER 3

METHOD

Sample

Data for this study was obtained from the American Changing Lives (ACL) Survey: Wave 1, 1986 and Wave 2, 1989. The ACL was part of a large research program designed to investigate: (a) the ways in which a wide range of activities and social relationships that people engage in were broadly "productive"; (b) how individuals adapted to acute life events and chronic stresses that threaten the maintenance of health, effective functioning, and productive activity; and (c) the determinants and consequences of productive activities and relationships.

The ACL contained longitudinal survey data. The sample included noninstitutionalized subjects aged 25 years and over in the United States, exclusive of Alaska and Hawaii. Individuals residing in group quarters or institutions were excluded from the survey. The survey used multistage-stratified probability sampling, with Blacks and elderly (60 years and older) oversampled. The ALC included four-stage selection stages. The primary stage of sampling involved the probability proportional to size (PPS) selection of the U.S. Standard Metropolitan Statistical Areas (SMSAs) and non-SMSA counties. The second stage sampled area segments within sampled primary stage sampling units (PSUs). The third stage was a systematic selection of housing units from all housing units (HU) listed for the sample area segments. The fourth stage was the selection of respondents within a sample HU.

The survey used two oversampling strategies. The first was the specification of a

2 to 1 oversampling of respondents who were 60 years and older. Further, Black respondents were sampled at twice the proportion of non-Blacks in their age group. The final sample consisted of 3,617 respondents in the first wave. The second wave included 2,867 respondents from the first wave. The smaller number of respondents in the second wave was caused by failure to locate the respondents, death, and institutionalization.

Two inclusive criteria were used in selecting cases for this study. First, only individuals with experience caregiving to the chronically ill were included. Respondents who answered yes to the following question were considered: "Now I would like to talk with you about friends and relatives who have trouble taking care of themselves because of physical or mental illness, disability, or for some other reason. Are you currently involved in helping someone like this by caring for them directly or arranging for their care by other?" Second, only respondents who were caring for aged relatives (such as a spouse, parent, grandparent, aunt, and uncle) were included, which reduced the number of cases available for this study to 335 for Wave 1 and 271 for Wave 2. However, these two samples were not considered as completely independent samples because 99 cases were included in both waves.

This study only chose subjects who cared for an elderly relative and had chronic caregiving experience. Therefore, not all subjects in Wave 1 remained as a caregiver in Wave 2. On the other hand, some people became a caregiver in Wave 2 although they did not provide care to a chronic ill relative in Wave 1. Results showed that 99 cases were found in both waves. To insure the independence of samples, these cases (N=99) were further dropped from Wave 1. The final sample of Wave 1 and Wave 2 was 236 and 271 respectively.

Evaluation of reliability

The items, indicators, were selected based on the following procedures. First, the indicators of each latent variable were selected based on face validity. Each item was examined to determine whether it was conceptually descriptive of the assigned dimension. Tables 3.1, 3.2, and 3.3 contains a listing of the survey items that were selected based on their face validity. These items were used to develop measures of the constructs depicted in Figure 1.3. Second, exploratory factor analysis was used for data reduction and scale development. It was conducted with all multi-item measures, either to confirm the underlying structures of established scales or to develop outcome measures used in the present research. Reliability of multi-item measures was evaluated using Cronbach's alpha coefficient (Cronbach, 1951), which is considered a conservative estimate of internal consistency reliability with an acceptable value of and above 70 (Nunnally, 1978). Third, confirmatory factor analysis was used to evaluate reliability for each observable indicator. The reliability of the measures is reflected in the factor loading associated with each observable indicator. The square of the factor loading is the amount of true score variance as a proportion of total variance, which is defined as the reliability in structural equation modeling. The greater the proportion of true score variance, the higher the reliability of the indicator. Items with more than 20% true variance or with factor loading exceeding 0.40 are generally considered to be acceptable in social sciences (Liang, 1986). The standardized factor loading as well as the measurement error estimates derived with confimatory factor analysis provide the basic information about the psychometric properties of these indicators. The final list of survey items may vary according to the reliability estimation.

Table 3.1

Latent Variable Indicators for Stimuli and Coping mechanism

Concepts in the RAM	Concepts in the Theory of Caregiver Stress	Item Description (empirical indicators for concepts in the theory of caregiver stress)
Focal	Objective burden in caregiving	Care arrangement Do you actually help to care for him/her, or do you arrange for his/her care by others, or do you do both? Hours of care About how many hours did you spend doing this in the past years?
Contextual	Stressful life events	Stressful life events 1. Death of spouse 2. Being robbed or burglarized 3. Lost a job 4. Being physically attach 5. Death of a parent 6. Death of a close friend/relative 7. Serious illness 8. Life-threatening illness/accident 9. Divorce/separation 10. Serious financial problems 11. Death of children 12. Other
	Social support	Friend/relative total support and demand 1. How much do you feel your friend/relative makes too many demands on you? 2. How much are they (friend/relative) critical of you or what you do?

Table 3.1 continued

Concepts in the RAM	Concepts in the Theory of Caregiver Stress	Item Description (empirical indicators for concepts in the theory of caregiver stress)
		3. How much is your friend/relative willing to listen when you need to talk about your worries or problems?
		4. How much does your friend/relative make you feel loved and cared for?
	Social roles	Number of social roles
		1. Spouse
		1a. Are you currently married, separated, divorced, widowed, or have you never been married?
		1b. Are you currently living with another adult as a partner in an intimate relationship?
		2. Parent
		2a. Interview checkpoint (children 17 or younger live in the household)
		2b. Do you have any children who are not living here with you at the present time?
		3. Worker
		3a. On the average, how many hours a week do you work at this job, including paid and unpaid overtime?
		3b. People often pay each other to do work or chores instead of going to a regular business. During the past 12 months, were you paid to do any work of this sort that was not part of a regular job?
		4. Volunteer or informal helper

Table 3.1. continued

Concepts in the RAM	Concepts in the Theory of Caregiver Stress	Item Description (empirical indicators for concepts in the theory of caregiver stress)
		4a. Altogether, about how many hours did you spend on volunteer work of this kind/these kinds during the last 12 months?
		4b. Altogether, about how many hours did you spend doing these things during the last 12 months?
Residual	Race	Race
		Respondent ethnic group
	Age	Age
		Respondent age
	Gender	Gender
		Respondent sex
	Relationship with the care recipient	Relationship with the care recipient
		Who is this person? (What is this person's relationship to you?)
Coping mechanism	Perceived caregiver stress	Perceived caregiver stress
		How stressful is it for you to take care of (him/her) or to arrange for (his/her) care?

Table 3.2.

Latent Variable Indicators for Adaptive Modes

Concepts in the RAM	Concepts in the Theory of Caregiver Stress	Item Description (empirical indicators for concepts in the theory of caregiver stress)
Physiological function	Physical function	Functional health 1. Are you currently in bed or in a chair for most or all of the day because of your health? 2. How much difficulty do you have bathing by yourself? 3. How much difficulty do you have climbing a few flights of stairs? 4. How much difficulty do you have walking several blocks? 5. How much difficulty do you have doing heavy work around the house? Number of chronic illnesses 1. Have you had arthritis or rheumatism? 2. Have you had lung disease? 3. Have you had hypertension? 4. Have you had a heart attack or other heart trouble? 5. Have you had diabetes? 6. Have you had cancer? 7. Have you had circulation problems? 8. Have you had a stroke? 9. Have you had fracture? 10. Have you had urinary incontinence? Self-rated health

Table 3.2 continued

Concepts in the RAM	Concepts in the Theory of Caregiver Stress	Item Description (empirical indicators for concepts in the theory of caregiver stress)
		How would you rate your health at the present time?
Self-concept	Self-esteem/ mastery	Self-esteem/mastery index 1. I take a positive attitude toward myself. 2. At times I think I am no good at all. 3. All in all, I am inclined to feel that I am a failure. 4. Sometimes I feel that I am being pushed around in life. 5. There is really no way I can solve the problems I have.
Role function	Role enjoyment	Role enjoyment index 1. How much do you enjoy caring for (this child /these children)? 2. How much do you enjoy doing that work (home maintenance)? 3. How much do you enjoy doing housework? 4. How much do you enjoy doing that work (regular job)? 5. How much do you enjoy doing that work (irregular job)? 6. How much do you enjoy doing that volunteer work? 7. How much do you enjoy helping friends, neighbors, and relatives?

Table 3.2. continued

Concepts in the RAM	Concepts in the Theory of Caregiver Stress	Item Description (empirical indicators for concepts in the theory of caregiver stress)
Interdependence	Marital satisfaction	Marital satisfaction index 1. Taking all things together, how satisfied are you with your marriage/relationship? 2. There is a great deal of love and affection expressed in our relationship. 3. My (husband/wife/partner) doesn't treat me as well as I deserve to be treated. 4. I sometimes think of divorcing or separating from my (husband/wife/partner). 5. There have been things that have happened in our (marriage/relationship) that I can never forgive.
	Reciprocity	Reciprocity index 1. During the last 12 months, did you provide transportation, shop, or run errands for friends, neighbors, or relatives who did not live with you? 2. Did you help others with their housework or with upkeep on their house, car, or other things? 3. Did you do childcare without pay for persons not living in your household? 4. Did you do any other things in the past 12 months to help neighbors, friends, or relatives who do not live with you?

Table 3.3.

Latent Variable Indicators for Depression

Concepts in the RAM	Concepts in the Theory of Caregiver Stress	Item Description (empirical indicators for concepts in the theory of caregiver stress)
Coping mechanism or an adaptive mode (psychological function)	Depression	Depression 1. I felt depressed. 2. I felt that everything I did was an effort. 3. My sleep was restless. 4. I was happy. 5. I felt lonely. 6. People were unfriendly. 7. I enjoyed life. 8. I did not feel like eating. My appetite was poor. 9. I felt sad. 10. I felt that people disliked me. 11. I could not get going.

Measures

Input

Focal Stimulus--Objective Burden in Caregiving

Two single indicator latent variables, care arrangement and hours of care, were used to represent objective burden in caregiving.

Care arrangement. Care arrangement was measured by one item: "Do you actually help to care for him/her, or do you arrange for his/her care by others, or do you do both?" Care arrangement was coded as a dummy variable with 1 equal to providing direct care and/or arranging care and 0 equal to arranging care only. Providing direct care indicated more objective burden in caregiving.

Hours of care. Hours of care was the hours provided by the caregiver in the past year. It was categorized as less than 20 hours, 20 to 39 hours, 40-79 hours, 80-159 hours and 160 hours and more. Providing more hours of care reflected more burden in caregiving.

Contextual Stimulus--Stressful Life Events, Social Support and Social Roles

Stressful life events. Stressful life events was measured with a 12-item checklist containing negative or undesirable events, such as death of spouse, being robbed or burglarized, losing a job, being physical attach, death of a parent, death of a close friend/relative, serious illness, life-threatening illness/accident, divorce/separation, serious financial problem, death of children, and other events. Respondents were asked to report whether they had experienced any of these events within the past three years. Information was gathered for this study on only those events that had occurred in 1988 and 1989 for Wave 2 and in 1985 and 1986 for Wave 1. Some researchers have devised a

number of ways to weigh events on life stress scales. No weight was used because research had shown that results from weighted and unweighted stress measures are virtually identical (Thoits, 1982). A simple summation of score, the stressful life events index, was created in this study by summing the number of events reported by each respondent. A high score on this index reflected more stressful life experience.

Social support. Social support was operationalized as friend and relative total support and demand. There were several reasons that this present study used friend/relative total support and demand instead of a more broad range of social support. As discussed in the chapter 1, this present study focused on the quality of the social support. Ideally, all the relationships within the caregivers' environment should be included, such as spouse, children, parents, and friend/relative. However, to avoid the possible confounding effect between social support and marital satisfaction, spouse support was excluded from the measures. In addition, this sample included age range from 20s to 80s. Many of participants in this existing data set had no children and/or parents because they were in different life stage by the time of investigation. Therefore, parents and children support measures had a large amount of missing data. To avoid excessively manipulating the data leading to artificially reduce the variance among constructs, parents and children support were also excluded.

Friends/relative support and demand represent the quality of social support. It was estimated by four items: friends/relatives' demands, criticism, love and care, and willingness to listen. Higher scores indicated lower demand and higher support from their friends/relatives.

Social roles. Social roles was operationalized by summing the number of social

roles the caregiver actually occupies. Summed social roles included spouse, parent, worker, and volunteer/informal helper. Higher scores indicated more social roles.

Residual Stimuli--Race, Age, Gender and Relationship with the Care Recipient.

Residual stimuli included race, age, gender, and relationship with the care recipient. Race was represented by how the caregiver perceived his/her ethnic group. Age was the chronological age of the caregiver. Relationship with the care recipient was measured by one question, "What is this person's relationship to you?"

Control Process

Coping Mechanism—Perceived Caregiver Stress

The coping mechanism was represented by perceived caregiver stress. It was measured by one item: How stressful the caregiver feels about caring for or arranging the care for the recipient. The 11-item Center for Epidemiological Studies Depression Scale (CES-D) was used as criteria to evaluate the validity of the perceived caregiver stress because studies have shown that stress measurement has the same pattern of relationship with psychosocial well-being, such as depression (Barnet et al., 1996; Mosley et al, 1996). The correlation between depression and perceived caregiver stress was .25, which was statistically significant at $p < .001$. A high score on this measure reflected more perceived caregiver stress.

Output

Physiological Function--Physical Function

Physical function consisted of three dimensions: functional health, number of

chronic illnesses, and self-rated health.

Functional health. The caregiver's functional health measured whether he/she was bedbound, or whether he/she has difficulty bathing, climbing stairs, walking, or doing heavy housework and the degree of difficulty of these tasks. It was the sum of positive responses to the above items. A high score on this measure reflected a higher level of physical function.

Number of illnesses. The number of chronic illnesses was the medical definition of physical health, whereas functional health was the social definition of physical health. Self-rated health reflected the psychological dimension of physical health. The number of chronic illnesses was the sum of the following chronic diseases: arthritis or rheumatism, lung disease, hypertension, heart disease, diabetes, cancer, circulation problems, stroke, fracture, and urinary incontinence. A low score on this measure indicated high physical function.

Self-rated health. Self-rated health was measured by a single item that asked caregivers to rate their own health. It was a four-point scale item ranging from excellent to poor health. A high score on this index reflected high physical function.

Self-concept--Self-Esteem/Mastery

The caregiver's self-esteem and mastery were combined to reduce the number of parameters in the following analysis. Self-esteem was measured by three items: "take positive attitude toward self," "I am no good at all," and "see self as failure." The mastery index was measured by the caregiver's "feeling of being pushed around in life," and "how he/she perceives his/her ability to solve problems." These items were measured by a four-point scale ranging from strongly agree to strongly disagree. The self-esteem and mastery

indexes were combined to reduce the parameter numbers and to avoid the problem of collinearity in further analysis. A high score on this measure reflected higher self-esteem/mastery.

Role function--Role Enjoyment

Role enjoyment was the average of the following items: enjoy regular job, enjoy irregular job, enjoy house maintenance, enjoy housework, enjoy volunteering, enjoy informal helping, and enjoy childcare. The enjoyment level of these roles was measured by using a five-point scale ranging from "a great deal" to "not at all." High scores on this index indicated greater role enjoyment.

Interdependence--Marital Satisfaction and Reciprocity

Interdependence mode was represented by the caregiver's marital satisfaction and reciprocity.

Marital satisfaction. Marital satisfaction was measured by five items: "Overall satisfaction with relationship," "love and affection expressed from spouse or significant other," "whether treats me well," "whether thinking about divorce or separation," and "things happened that can never forget." Items have been recoded so that higher scores in these items would point to increasing measures in marital satisfaction. Marital satisfaction was the sum of the recoded items included in the measure. Higher scores on this indicator represented higher levels of marital satisfaction.

Reciprocity. Reciprocity was measured by four items, which were related to providing support to others. They were assessed with four binary indicators that determine whether the caregiver provides various kinds of tangible assistance to friends, neighbors, and relatives. These four items were (a) providing transportation, shop, and

run errands for other; (b) providing childcare to others; (c) doing household chores for others; and (d) other kinds of assistance. The reciprocity index was the sum of the items included in the measure. A higher score on this measure indicated that the caregivers were more capable of reciprocating and providing support to members in his/her social network.

Although there were several ways to obtain reciprocity measure, this study used only the numbers of support that caregivers provided to other to indicate the level of reciprocity. Caregivers tended to receive help from other since they carried the burden of caregiving. Providing more support to other, therefore, indicated that caregivers had more ability to reciprocate. It corresponded to the study of Dwyer, Lee and Jankowski (1994). Their study used 4 possible tasks or helps that elders provided to caregivers to show elders' level of reciprocity.

Depression

Depression represented either one part of the coping mechanism or an adaptive mode (psychological function). Depression was measured by the 11-item Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977). The CES-D was originally developed by Radloff (1977) as a brief unidimensional depression scale comprised of 20 items. The CES-D assessed mood and the level of overall functioning in the last seven days. Subsequent to its introduction, four basic dimensions (i.e., depressed affect, positive affect, interpersonal problems, and somatic problems) have been isolated. Recently, Shrout and Yager (1989) demonstrated the validity of a shortened version of the scale. The 11-item CES-D version was used in this study. This version included items

such as feeling depressed, restless, happy, lonely, sad, people dislike me, people were unfriendly, enjoy life, poor appetite, cannot keep going, and everything was an effort. They were measured on a three-point scale from "hardly ever" to "most of the time." Higher scores indicated higher levels of depression.

Hypotheses

One main hypothesis and ten subhypotheses evolved from the propositions in the theory of caregiver stress that was shown in Table 2.2.

Main Hypothesis

The relationships among input (Objective burden in caregiving, stressful life events, social support, social roles, race, age, gender, and relationship with the care recipient), control process (perceived caregiver stress), output (physical function, self-esteem/mastery, role enjoyment, marital satisfaction, reciprocity), and depression will hold when holding constant other factors in the theory.

Subhypotheses

1. Caregivers' objective burden predicts perceived caregiver stress.
2. Caregivers' objective burden is the most important variable predicting perceived caregiver stress.
3. Higher perceived caregiver stress predicts lower levels of physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity.
4. Physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity are interrelated.
5. Stressful life events have a main effect on perceived caregiver stress and/or an

interactive effect on the relationship between objective burden and perceived caregiver stress.

5.1. Stressful life events have a main effect on perceived caregiver stress.

5.2. Stressful life events have an interactive effect on the relationship between objective burden and perceived caregiver stress.

6. Social support has a main effect on perceived caregiver stress and/or an interactive effect on the relationship between objective burden and perceived caregiver stress.

6.1. Social support has a main effect on perceived caregiver stress.

6.2. Social support has an interactive effect on the relationship between objective burden and perceived caregiver stress.

7. Social roles have a main effect on perceived caregiver stress and/or an interactive effect on the relationship between objective burden and perceived caregiver stress.

7.1. Social roles have a main effect on perceived caregiver stress

7.2. Social roles have an interactive effect on the relationship between objective burden and perceived caregiver stress.

8. Race, age, gender, and relationship with the care recipient, as a group of residual stimuli, have a main effect on perceived caregiver stress.

9. Objective burden, stressful life events, social support, social roles, and other stimuli have no direct effect on the caregivers' physical function, self-esteem/mastery, role enjoyment, marital satisfaction and reciprocity.

10. Depression is predicted by perceived caregiver stress or mediates perceived

caregiver stress/adaptive modes relationship.

10.1. Depression mediates the relationship between perceived caregiver stress and the caregiver's adaptive modes: physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity.

10.2. Physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity associate with depression.

Analysis

Missing Data Estimation

The final sample may be smaller than 271 for Wave 2 and 236 for Wave 1 due to missing values or "not applicable" answers. D. Baer (personal communication, August 1997) recommended the use of missing data estimation to deal with large amount of missing data, such as "non applicable" answer in marital satisfaction in this study. M. Marsiske (personal communication, January 1998) further illustrated a method developed by Clifford Clogg to handle this problem. The approach is to create a product term that allows only caregivers with available information to contribute to the parameter estimation in the structural equation model. Therefore, in this study, indicators with large numbers of non-applicable answers, such as marital satisfaction, were handled by this approach. When indicators had only a few missing cases because of no respond from the participants in the original study, mean substitution was used.

Power Analysis

Power is the probability of rejecting the null hypothesis, H_0, when it is incorrect, given that an alternative hypothesis, H_1, is true. It is the ability to detect the existing

relationship between/among variables. In other words, it is the confidence level for judging whether a model is a valid one if it is truly a good model. Power is a function of (a) the significance level, or alpha; (b) sample size; (c) effect size; and (d) degree of freedom in structural equation model.

In power analysis, type I error occurs when a researcher erroneously rejects a true null hypothesis. It means that the researcher concludes incorrectly that there is an existing relationship between/among variables when there is really no relationship. In other words, it is the probability to conclude that the model fits when, in fact, the model is truly a bad one. The probability of having a type I error is taken by the investigator as the level of significance, alpha (α). The difference between a root-mean-square error of approximation (RMSEA) for null and an alternative model reflects the effect size in the structural equation model. The degree of freedom refers to that of associated null model. Power was evaluated by the methods developed by MacCallum, Brown, and Sugawara (1996) using the SAS statistic program.

In addition to power analysis, to ensure the accuracy of chi-square estimations in the structural equation model, Bollen (1989) suggested that the more free parameters in a model, the larger the sample size should be. The rule of thumb is to have at least several cases per free parameter. Anderson and Gerbing (1984) found that a sample size less than 100 tends to increase the chance of rejecting the null hypotheses using chi-square estimator $(N-1)\ F_{ML}$. Boomsma (1983) also recommended 100 or more cases to avoid inaccurate chi-square estimation.

Data Analysis

Preliminary data analysis was carried out as follows. Univariate and bivariate statistics for each measured variable were used to describe the sample and to ensure that the data agreed with the underlying assumption of analysis techniques. Factor analysis was used for data reduction and to estimate the factor structure and validity of the measures. All preliminary data analysis techniques were performed by SPSS (Version 6.1.2) statistic program on an IBM-compatible computer.

Hypotheses 1,2, and 5 through 8 state that the relationships between environmental stimuli and the caregiver's perception of stress are significant. Hypothesis 3 predicts a prominent relationship between the caregiver's perception of stress and adaptive modes. Hypothesis 4 predicts the relationships among modes. Hypothesis 9 predicts a insignificant relationship between stimuli and adaptive mode. Hypothesis 10 states the possible effect of depression in the model. Five structural equation models were used to test the proposed hypotheses. A preliminary model was specified to test the direct path between stimuli and perceived caregiver stress (Hypotheses 1, 2, 5.1, 6.1, 7.1, and 8), direct path between perceived caregiver stress and adaptive modes (Hypothesis 3) and relation among adaptive modes (Hypothesis 4). The second model was used to test the direct effect of stimuli on adaptive modes (Hypothesis 9). The third model examined the mediating role of depression between perceived caregiver stress and adaptive modes (Hypothesis 10.1). The fourth model was used to investigate the role of depression as an adaptive mode (Hypothesis 10.2). Finally, the fifth model was adopted to test the moderator role of contextual stimuli (Hypothesis 5.2, 6.2, and 7.2).

The structural equation models were estimated with LISREL 8.1 for the IBM-

compatible computer. The estimation of each model were performed as follows. First, confirmatory factor analysis was used to construct a measurement model, linking the observed indicators to latent factors for Wave 2 data. Second, the structural models were estimated for Wave 2 data to examine the hypothesized relationships among latent variables. The method of nested models was used to determine whether the hypothesized model was superior than the alternative model. Thus, the hypothesized model was compared to a fully saturated model and compared to its proceeding model. The desired result was that the hypothesized model was significantly better than the starting model, but was not significantly different than the fully saturated model.

The preferred model was then modified based on both theoretical and statistical considerations using specification search (Leamer, 1978; Long, 1983; MacCallum, 1986). This final data-derived model was then estimated simultaneously for 1989 and 1986 samples using two-group estimation procedures to cross-examine its validity.

The fitness of each model was shown using absolute goodness-of-fit indices (chi-square [X^2], goodness-of-fit index [GFI], and adjusted goodness-of-fit index [AGFI]), comparative fit indices (change in chi-square [ΔX^2], relative noncentral index [RNI] [McDonald & Marsh, 1990], and the relative normed fit index [RNFI] [Mulaik et al., 1989]). Although the chi-square statistic does not provide much useful information about model fit and depends heavily on sample size, it is a standard statistic reported in structural equation modeling approaches. Therefore, it was reported in the present study to be consistent with past studies. The change in chi-square statistics was also used to compare each model with the model preceding it. A significant change in chi-square

statistics shows that additional constrains or parameters resulted in a significantly poorer or better fit of the model. GFI and AGFI provided by the LISREL program are also dependent on sample size. In contrast, the RNI and RNFI do not depend on sample size and, thus, were mainly utilized in this analysis. The RNI compares the fit of a model to that of a null model which assumed no relationships among the variables. The RNFI compares the fit of a hypothesized model to the fit of the null model by controlling for the fit of a measurement model. Values of GFI, AGFI, RNI, and RNFI between 0.9 and 1.0 indicate a good fit between the model and data.

CHAPTER 4

PRELIMINARY RESULTS

Sample Characteristics

Focal Stimuli

Objective burden in caregiving, care arrangement and hours of care are illustrated in Table 4.1 for both waves. The time spent on caregiving is similar in both waves, while less than half the caregivers spent more than 160 hours per years taking care of their chronically ill relatives (42.4% vs. 41.3%). Care arrangement is statistically different (significant at $p < 0.10$). Wave 1 respondents are more likely than Wave 2 respondents to

Table 4.1.

Focal Stimuli (Objective Burden in Caregiving) and Comparisons by Waves

	Wave 1		Wave 2		
Measure	n (236)	%	n (271)	%	p [a]
Care arrangement					
Direct care for	111	47.0	114	42.1	.06
Arrange care	56	23.7	51	18.8	
Both	69	29.2	106	39.1	
Hours of care					
<20hours	38	16.1	30	11.1	.45
20-39 hours	28	11.9	39	14.4	
40-79 hours	35	14.8	48	17.7	
80-159 hours	35	14.8	42	15.5	
≥160 hours	100	42.4	112	41.3	

[a] Statistical significance was determined either by t-test or chi-square.

either provide care (47.0% vs. 42.1%) or arrange care (23.7% vs. 18.8%), while Wave 2 respondents are more likely to report providing both direct care and arranged care (29.2% vs. 39.1%).

Contextual stimuli

Stressful life events, social support and social roles. Prevalence of stressful life events and the mean score of social support are similar in the two waves. The number of stressful life events is compared: about half of the respondents reported no such events in the past two years (51.7% vs. 57.6%). Of the respondents, 38% and 35% reported one stressful life event, while 10.1% and 7.4% reported two or more such events in Waves 1 and 2, respectively. Likewise, there is no significant difference in social support, although mean scores of social support in Wave 2 are slightly higher than those in Wave 1.

The number of social roles for Wave 1 and Wave 2 respondents is significantly different. Caregivers are more likely to have fewer social roles in Wave 1 than in Wave 2, with an average number of social roles of 2.98 and 3.20 for Waves 1 and 2, respectively. Table 4.2 details the prevalence of stressful life events, social support, and number of social roles for both waves.

Residual Stimuli and the Other Selected Demographic Information

Race, age, gender, and marital status are similar for both waves. The samples consist of 236 subjects in Wave 1 and 271 in Wave 2. Sixty-five and sixty-eight percent of respondents are White for Wave 1 and 2, and remainders are African American

Table 4.2.

Contextual Stimuli (Stressful Life Events, Social support, and Social roles) and Comparisons by Waves

	Wave 1			Wave 2			
	n		M	n		M	
Measure	(236)	%	(SD)	(271)	%	(SD)	p[a]
Stressful life events			.57 (.69)			.50 (.64)	.13
0	122	51.7		156	57.6		.49
1	90	38.1		95	35.1		
2	22	9.3		19	7.0		
3	2	.8		1	.4		
Social support			15.92 (2.93)			16.28 (2.61)	.15
Social roles			2.98 (0.92)			3.20 (0.78)	.00

[a] Statistical significance was determined either by t-test or chi-square.

(33.5 % vs. 29.9%), American Indian (.4% vs. 1.1%), Asian (.4% vs. 1.1%), and Hispanic (.4% vs. .0%). The samples range in age from 25 to 84 and 27 to 87, with a mean of 53.56 and 53.41 for Waves 1 and 2, respectively. There are more female caregivers than male ones in both waves (64.0% vs. 68.3). Sixty-nine percent Wave 1 respondents vs. 70% of Wave 2 are married, the remainder are separated (5.9% vs. 3.3%), divorced (12.3% vs. 11.4%), widowed (6.4% vs. 6.6%), and never married (6.4% vs. 7.7%).

Education, employment status, and relationship with care recipient are significantly different in Waves 1 and 2. Respondents in Wave 2 received higher education than respondents in Wave 1 (significant at $p < 0.01$), and the mean educational

level represented by duration in school are 11.66 and 12.48 years for Waves 1 and 2, respectively. Caregivers in Wave 1 are less likely to be employed than caregivers in Wave 2 (49.6% vs. 62.7%) at the time of the survey ($p<0.01$). In addition, the relationship between caregiver and care recipient is also different (significantly at $p<0.01$). Respondents are more likely to be a spouse (22.0% vs. 12.5%) or other relative (17.4% vs. 14.0 %) in Wave 1, and children or children-in-law (60.6% vs. 73.4%) in Wave 2. Table 4.3 shows selected demographic characteristics for both waves.

In summary, caregivers in Wave 1 are more likely to provide either direct care or arranged care, although the hours of care are similar in both waves. Prevalence of stressful life events and the mean of social support are comparable in both waves. Caregivers in Wave 2 have significantly more social roles than those in Wave 1. Caregivers are similar in race, age, gender, and martial status for both waves and different in education (more in Wave 2), employment status (more unemployed in Wave 1), and relation to care recipients (more spouse and relative in Wave 1; more children and children-in-law in Wave 2).

Coping Mechanism

Respondents in both waves had similar ratings of perceived caregiver stress. Examined for perceived caregiver stress, 21.6% and 22.1% of respondents in Waves 1 and 2, respectively reported "quite and very" stressful experiences. Over 45% reported that their experience was not at all stressful or not too stressful. Perceived caregiver stress is shown in Table 4.4 for both waves.

Table 4.3.

Residual Stimuli and Other Demographic Characteristics of the samples and Comparisons by Waves.

	Wave 1			Wave 2			
	n		M	n		M	
Measure	(236)	%	(SD)	(271)	%	(SD)	p[a]
Residual stimuli							
Race							
White	154	65.3		185	68.3		.49
Black	79	33.5		80	29.5		
American Indian	1	.4		3	1.1		
Asian	1	.4		3	1.1		
Hispanic	1	.4		0	0.0		
Age, in years			53.56 (16.36)			53.41 (14.43)	.91
Gender							
Male	85	36.0		86	31.7		.31
Female	151	64.0		185	68.3		
Relationship with the care recipient							
Spouse	52	22.0		34	12.5		.00
Parents/Parents-in law	143	60.6		199	73.4		
Other relatives	41	17.4		38	14.0		
Other demographic characteristics							
Education, in years			11.66 (3.07)			12.48 (3.04)	.00
Marital status							
Married	163	69.1		192	70.8		.66

Table 4.3. continued

	Wave 1			Wave 2			
Measure	n (236)	%	M (SD)	n (271)	%	M (SD)	p[a]
Separate	14	5.9		9	3.3		
Divorced	29	12.3		31	11.4		
Widowed	15	6.4		18	6.6		
Never married	15	6.4		21	7.7		
Employment status							
Employed	117	49.6		170	62.7		.00
Unemployed	119	50.4		101	37.3		

a Statistical significance was determined either by t-test or chi-square.

Table 4.4.

Coping Mechanism (Perceived Caregiver Stress) and Comparisons by Waves

Measure	Wave 1		Wave 2		p[a]
	n (236)	%	n (271)	%	
Perceived caregiver stress					
Not at all stressful	46	19.5	57	21.0	.75
Not too stressful	62	26.3	78	28.8	
Somewhat stressful	77	32.6	76	28.0	
Quite stressful	26	11.0	35	12.9	
Very stressful	25	10.6	25	9.2	

[a] Statistical significance was determined either by chi-square.

Four Adaptive Modes

Adaptive modes are illustrated in Table 4.5 for both waves in which caregivers' physical function, role enjoyment, and marital satisfaction are similar. Respondents in Wave 1 are not significantly healthier than those in Wave 2. Examined for functional health, approximately 81% of caregivers reported no functional impairment in either wave. The numbers of chronic illnesses are also comparable in both waves with an average of 1.26 and 1.37 for Waves 1 and 2, respectively. The distribution of self-rated health is also similar in the two waves, with only approximately 20% of caregivers rating their health either fair or poor. The two waves are also not significantly different in role enjoyment with the mean score of 4.00 for both waves. Both waves share similar scores in caregiver's martial satisfaction with -.12 vs. .05 for Waves 1 and 2, respectively.

Table 4.5.

Adaptive Modes and Comparisons by Waves

	Wave 1			Wave 2			
	n		M	n		M	
Measure	(236)	%	(SD)	(271)	%	(SD)	p [a]
Physical function							
Functional health							
Most severe impairment	7	3.0		9	3.3		.87
Moderately severe impairment	19	8.1		17	6.3		
Least severe impairment	18	7.6		23	8.5		
No impairment	192	81.4		222	81.9		
Number of chronic illnesses			1.26 (1.28)			1.37 (1.34)	.36
Self-rated health							
Excellent	34	14.4		42	15.5		.95
Very good	88	37.3		95	35.1		
Good	65	27.5		79	29.2		
Fair	38	16.1		45	16.6		
Poor	11	4.7		10	3.7		
Self-esteem/mastery			16.02 (3.11)			16.84 (2.86)	.00
Role enjoyment			4.00 (0.67)			4.00 (0.67)	.96
Marital satisfaction [b]			-0.12 (3.66)			0.05 (3.61)	.67
Reciprocity			2.10 (1.36)			2.60 (1.25)	.00

Note. [a] Statistical significance is determined either by t-test or chi-square. [b] Score of marital satisfaction is standardized.

In contrast, self-esteem/mastery ($p<0.01$) and reciprocity ($p<0.01$) differ in caregivers from Wave 1 and Wave 2. Caregivers had lower self-esteem/mastery score in Wave 1 than Wave 2 (16.02 vs. 16.84). Respondents also got lower reciprocity scores in Wave 1 than in Wave 2, with respective reciprocity item for Waves 1 and 2 of 2.10 and 2.60 out of a maximal score of 4.00.

In general, caregivers' adaptive modes are not quite the same for the two waves. While caregivers share similar physical function, role function, and marital satisfaction scores, their self-esteem/mastery and reciprocity scores are significantly different.

Depression

Depression is also statistically different ($p <0.05$). Respondents in Wave 1 reported more depression than those in Wave 2, with the mean CES-D 11-item score to be 16.00 (SD=4.14) and 15.15 (SD=3.87) for Waves 1 and 2, respectively.

In summary, although two waves caregivers have many similar characters, Wave 1 caregivers are more likely to be spouse, provide more direct care, have less social roles, have less education, tend to be unemployment, have lower self-esteem/mastery and have less ability to reciprocate than Wave 2 caregivers. It congruencies with the findings of past research. It is possible that most of wave 1 caregivers are spousal caregivers that introduce to many caregiving tasks because the expectation associated with role of spouse. However, it needs to be further confirmed by multivariate analysis.

Factor analysis for data reduction

To confirm the factor structures of the measures or to develop scales for use in subsequent analyses, exploratory factor analysis was used with all multiple-item measures. Pearson product-moment correlation matrices were used as input, with initial factors extracted by principle component analysis and with missing data deleted by listwise procedure. The Kaiser-Meyer-Olkin measure of sampling adequacy was used as an indicator of to confirm the prerequisite data structure for factor analysis (Kaiser, 1974). In Kaiser's measure, a value above 0.5 is acceptable for using factor analysis. The Kaiser criterion of eigenvalue equal to or greater than 1 was used to determine the number of factors extracted. Varimax rotation was used to enhance the interpretability of factors.

Social Support

Social support was analyzed with four questionnaire items by exploratory factor analysis. The resultant Kaiser-Meyer-Olkin measures of sampling adequacy were .56 and .51 for Waves 1 and 2, respectively. Two factors were extracted for both waves; they accounted for 74.7% and 77.3% of the variance by Kaiser criterion for Waves 1 and 2, respectively. As depicted in Table 4.6, all the factor loading in the final rotated solutions were high for both waves (above .40). Because the two factors were not strongly correlated in Wave 2 (0.14), to include both of them in the subsequent analysis would generate a complex covariance matrix beyond analytical solution. Friend/relative positive support, the most likely factor, was chosen in the measurement of social support in the subsequent analysis.

Table 4.6.

Factor Loading for Social Support

Items	Wave 1		Wave 2	
	Factor 1: Positive Support	Factor 2: Negative Hassles	Factor 1: Positive Support	Factor 2: Negative Hassles
1. How much do your friends/relatives make you feel loved and care for?	.89		.90	
2. How much are these friends/relatives willing to listen when you need to talk about your worries or problems?	.87		.88	
3. How much do your friends/relatives make too many demands on you?		.83		.87
4. How much are they critical of you or what you do?		.83		.85

Physical Function

Exploratory factor analysis was also conducted with three items: functional health, numbers of chronic illness and self-rated health to assess caregivers' physical heath. The resultant Kaiser-Meyer-Olkin measures of sampling adequacy were just mediocre for both waves with the KMO of 0.66 and 0.62 for Waves 1 and 2, respectively. Only one factor was extracted for both waves, which accounted for 61.8% and 61.1% of the variance based on the Kaiser criterion for Wave 1 and Wave 2, respectively. The detailed factor loading for the final rotated solution step is presented in Table 4.7, and it can be easily noted that all the loadings are high, above 0.40. Because of the complexity

involved in combining these three measures into one factor, three measures were used separately in subsequent analyses.

Table 4.7.

Factor Loading for Physical Health

Items	Factor Loading	
	Wave 1	Wave 2
Functional health	.78	.73
Numbers of chronic illness	.75	.77
Self-rated health	.82	.85

Self-Esteem/Mastery

Exploratory factor analysis was conducted with five questionnaire items that assess caregivers' self-esteem/mastery. The resultant Kaiser-Meyer-Olkin measure of sampling adequacy was good with a KMO of 0.73 and 0.76 for Waves 1 and 2, respectively. Only one factor was extracted, and it accounted for 44.2% and 46.2% of the variance based on Kaiser's criterion in Wave 1 and Wave 2, respectively. All the factor loadings were high (above .40) for both waves, except for "positive attitude to self" in the second wave. Since this item was only 0.01 below the cutoff for acceptability, it was still included. Factor loadings for both waves in the final rotated solution are presented in Table 4.8. Therefore, these five items could be combined to obtain a single indicator for self-esteem/mastery.

Table 4.8.

Factor Loading for Self-esteem/Mastery

Items	Factor Loading	
	Wave 1	Wave 2
Positive attitude toward myself	.50	.39
No good at all	.75	.77
Being a failure	.76	.72
Being pushed around in life	.67	.75
No way can solve the problems	.60	.70

Marital Satisfaction

Exploratory factor analysis was performed on caregivers' marital satisfaction with five questionnaire items. The resultant Kaiser-Meyer-Olkin measures of sampling adequacy were .76 and .77 for Wave 1 and 2. Only one factor was extracted, which accounted for 50.7% and 53.2% of the variance by Kaiser criterion for Waves 1 and 2, respectively. All the factor loadings were high in both waves (above .40), and the detailed loadings in the final rotated solution are depicted in Table 4.9. Since many missing data were involved with this specific measure, these five items could not be used separately. Instead, they were combined in subsequent analysis.

Reciprocity

Caregivers' reciprocity was analyzed with four questionnaire items by exploratory factor analysis. The resultant Kaiser-Meyer-Olkin measures of sampling adequacy were 0.71 and 0.65 for Waves 1 and 2, respectively. Only one factor was extracted, and it accounted for 49.3% and 45.5% of the variance in Waves 1 and 2, respectively. Similar to

Table 4.9.

Factor Loading for Marital Satisfaction

Items	Factor Loading	
	Wave 1	Wave 2
How satisfied with marriage/relationship?	.76	.80
A great deal of love and affection expressed	.69	.79
Spouse doesn't treat me as well as I deserve	.75	.70
Think of divorcing or separating	.73	.75
Things that I can never forgive	.62	.60

Table 4.10.

Factor Loading for Reciprocity

Item	Factor Loading	
	Wave 1	Wave 2
Transportation, shop, or run errands	.75	.75
Housework	.75	.71
Childcare	.59	.52
Other	.71	.67

previous analysis, all the factor loadings in the final rotated solution were high (above .40) as shown in Table 4.10. Therefore, these four items were combined as the measure of reciprocity for the following analysis to reduce the number of parameters.

Depression

Exploratory factor analysis was conducted with 11 items to assess depression. The resulted Kaiser-Meyer-Olkin measures of sampling adequacy (0.86 and 0.85 for the Waves 1 and 2, respectively) indicated that factor analysis was appropriate for these

items. The load is considered high with a loading coefficient above 0.4, and clean when the difference between the two loading coefficients is greater than 0.2. Judged by these standards, all CES-D items were loaded highly and cleanly for both waves with just one exception: "I felt sad," which was loaded on both Factor 1 and 2 in Wave 1. Although its loading in Factor 2 was considerably higher than that in Factor 1, the item was assigned to Factor 1 to be consistent with the factor structures in Wave 2. These factors accounted for 59.6% of total variance for Wave 1 and 60.3% of the total variance for Wave 2. The detailed loadings and factors in the final rotated solution are depicted in Table 4.11.

Three factors were shown: depressed & positive mood, somatic symptoms, and interpersonal. Although depressed mood and positive mood were found to be merged to one factor, three dimensions of the short version CES-D measure still reflected the original four dimensions of the 20-item CES-D measure proposed by Radloff (1977). The sum of the scores for three subscales (depressed mood and positive mood, somatic symptoms, and interpersonal) were used as separate indicators for depression in the structural equation modeling.

Univariate Statistics

Missing data and Variable Distributions

Univariate statistics for the measures used in subsequent analyses are listed in Table 4.12 and Table 4.13, and include the number of items per measure, percent missing data for each item, potential range of scores, actual range of scores, mean, standard deviation, skewness, and kurtosis. All items have been recoded so that higher scores in these items would point to increasing measures in latent construct except for care arrangement, race, gender, and relationship. Care arrangement, race, gender, and

Table 4.11.

Factor Loading for Short-Form CES-D Items[a]

Items	Wave 1			Wave 2		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
I was happy	**.76**			**.81**		
I enjoyed life	**.80**			**.74**		
I felt sad	**.63**			**.71**		
I felt depressed	**.48**	.55		**.71**		
I felt lonely	**.56**			**.70**		
Sleep was restless		**.57**			**.72**	
I couldn't get going		**.74**			**.72**	
Did not feel like eating		**.69**			**.66**	
Everything I did was an effort		**.59**			**.62**	
People were unfriendly			**.91**			**.86**
I felt that people disliked me			**.79**			**.81**

Note. Factor loadings of .40 or greater were included in the table. Boldface type indicates assignment of items to factors. [a]Factors 1 through 3 represented depressed & positive mood, somatic symptoms, and interpersonal, respectively.

relationship with the care recipient were coded dichotomously.

With the exception of marital satisfaction, the missing data ranges from 0-2.5% and 0-2.2% for all the other measures in Wave 1 and Wave 2. The exception in marital satisfaction with missing data of 30.5% and 27.7% for Waves 1 and 2, respectively was due to the fact that the measures were not administered to non-married caregivers. Product term of marital satisfaction and marital status was created to increase the possible

case number. Product term is shown in Table 4.12 and Table 4.13 in the row labeled "recoded and product term." In addition, missing data replacement was also implemented in an attempt to increase the number of cases with usable information. Product term and missing data replacement were described in detail in a corresponding section of the structural equation model in Chapter 5.

Structural equation modeling assumes normal distribution of continuous variables. In the present study, skewness and kurtosis value were within the acceptable range (-2.0 - +2.0), except for the interpersonal subscale of depression and functional health in Wave 1, and caregiver's relationship with care recipient and functional health in Wave 2. These variables were normalized, except for the relationship with care recipient.

The interpersonal subscale of depression was recoded, with zero assigned to nondepressive caregivers (value equal to 2) and one assigned to somewhat depressive caregivers (value equal or greater to 3). Functional health was recoded, with zero assigned to functional impaired caregiver (value less or equal to 3) and one assigned to nonfunctional impaired caregivers (value equal to 4). Univariate statistics for recoded variables were listed in Table 4.11 and Table 4.12 in the row labeled "recoded." The final result showed a tendency toward normality.

Relationship with care recipient was also skewed, due to the limited number of spousal caregivers. However, it was retained until it could be determined whether its lack of variability would cause a problem in subsequent analyses.

Table 4.12.
Univariate Data for Measures to be Used in Subsequent Analyses for Wave 1

Measure	# Items	% Missing Data	Potential Range	Actual Range	M	SD	Kurtosis[a]	Skewness[a]
Stimuli								
Objective burden in caregiving								
Care arrangement	1	0	0-1	0-1			-.46	-1.24
Hours of care	1	0	1-5	1-5			-1.22	-.54
Stressful life events	9	0	0-9	0-3	.59	.69	.19	-.90
Social support	2	0	2-10	2-10	7.65	1.95	.53	-.96
Number of social roles	4	0	0-4	0-4	2.98	0.92	-.15	-.69
Race	1	0	0-1	0-1			-1.60	-.65
Age	1	0		25-84	53.56	16.36	-1.23	-.10
Gender	1	0	0-1	0-1			-1.67	.59
Relationship with the care recipient	1	0	0-1	0-1			-.16	1.36
Coping mechanism								
Perceived caregiver stress	1	0	1-5	1-5	2.67	1.21	-.65	.36
Four adaptive modes								
Physical function								
Functional health	1	0	1-4	1-4	3.67	.75	4.07	-2.26
Functional health (recoded)	1	0	0-1	0-1	.81	.39	.63	-1.62

Table 4.12. continued

Measure	# Items	% Missing Data	Potential Range	Actual Range	M	SD	Kurtosis[a]	Skewness[a]
Number of chronic illnesses	1	0	0-10	5-10	8.74	1.28	-1.23	-.84
Self-rated health	1	0	1-5	1-5	3.41	1.01	-.50	-.38
Self-esteem/mastery	5	2.5%	5-20	7-20	16.02	3.11	-.01	-.75
Role enjoyment	1	0.4%	1-5	1-5	4.00	.67	1.24	-.78
Marital satisfaction	5	30.5%		-10.39-3.42	-.12	3.66	.10	-1.04
Marital satisfaction (product term)	5	0		-10.39-3.42			1.38	-1.24
Reciprocity	4	0.4%	0-4	0-4	2.10	1.36	-1.15	-.16
Depression								
Depressed & positive mood	4	2.1%	4-12	4-12	6.34	1.82	.42	.75
Somatic symptoms	5	0.4%	5-15	5-15	7.17	2.34	1.00	1.18
Interpersonal	2	0.4%	2-6	2-6	2.49	.86	2.73	1.72
Interpersonal (recoded)	2	0.4%	0-1	0-1	.29	.45	-1.14	.94

Note. Since marital satisfaction represents a standardized scores (Z-scores), the potential range cannot be determined.
[a]Acceptable values for skewness and kurtosis range from -2.0 - + 2.0.

Table 4.13.
Univariate Data for Measures to be Used in Subsequent Analyses for Wave 2

Measure	# Items	% Missing Data	Potential Range	Actual Range	M	SD	Kurtosis[a]	Skewness[a]
Stimuli								
Objective burden in caregiving								
Care arrangement	1	0	0-1	0-1			.58	-1.60
Hours of care	1	0	1-5	1-5			-1.10	-.54
Stressful life events	9	0	0-9	0-3	.50	.64	.29	1.00
Social support	2	0	2-10	2-10	7.91	1.77	0.42	-.81
Number of social roles	4	0	0-4	1-4	3.20	0.79	-.47	-.61
Race	1	0	0-1	0-1			-1.39	-.79
Age	1	0		27-85	53.41	14.43	-1.01	-.06
Gender	1	0	0-1	0-1			-1.39	.79
Relationship with the care recipient	1		0-1	0-1			3.20	2.27
Coping mechanism								
Perceived caregiver stress	1	0	0-5	0-5	2.61	1.22	-.70	.40
Four adaptive modes								
Physical function								
Functional health	1	0	1-4	1-4	3.69	.74	4.96	-2.42
Functional health (recoded)	1	0	0-1	0-1	.82	.39	.79	-1.67

Table 4.13. continued

Measure	# Items	% Missing Data	Potential Range	Actual Range	M	SD	Kurtosis[a]	Skewness[a]
Number of chronic illnesses	1	0	0-10	4-10	8.63	1.34	.49	-.92
Self-rated health	1	0	1-5	1-5	3.42	1.05	-.58	-.30
Self-esteem/mastery	5	2.2%	5-20	5-20	16.84	2.86	.16	-.82
Role enjoyment	1	0	1-5	1.67-5	4.00	.67	.10	-.71
Marital satisfaction	5	27.7%		-12.74-3.61	.05	3.61	.69	-1.07
Marital satisfaction (product term)	5	0		-12.74-3.61			1.92	-1.23
Reciprocity	4	0.4%	0-4	0-4	2.60	1.25	-.72	-.57
Depression								
Depressed & positive mood	4	0.4%	4-12	4-12	5.86	1.79	.35	.94
Somatic symptoms	5	1.1%	5-15	5-15	6.96	2.31	.70	1.16
Interpersonal	2	0	2-6	2-5	2.35	.68	1.74	1.75
Interpersonal (recoded)	2	0	0-1	0-1	.24	.43	-.44	1.25

Note. Since marital satisfaction represents a standardized scores (Z-scores), the potential range cannot be determined.
[a]Acceptable values for skewness and kurtosis range from -2.0 - + 2.0.

Reliability

The most commonly used reliability coefficient, Cronbach's alpha (Cronbach, 1951), was estimated for the following measures: depression, self-esteem/mastery, marital satisfaction, reciprocity, and social support to assess reliability. Cronbach's alpha coefficient values above .70 are considered acceptable (Nunnally, 1978). Based on this criteria, the reliability of all single indicator latent variables were acceptable, except self-esteem/mastery, and reciprocity in Wave 1 and reciprocity in Wave 2. All these exceptions were on the margin of rejection by Chronbach's statistics, since it is a conservative estimate of internal consistency (Nunnally, 1978). These indicators were still used in the following analysis unless it was noted specifically when the lack of reliability in these factors would cause a serious problem. Calculated values and published reliability data for these measures are reported in Table 4.14.

Table 4.14.

Reliability (Cronbach's Alpha Coefficient) for Summing Scores

	α		
	Wave 1	Wave 2	Published Data
Friend/relative positive support	.73	.74	.74 (House, 1986)
Depression	.83	.83	.81 (Kohout et al, 1993)
			.68 (Gallant, 1995)
Self-esteem/mastery index	.68	.70	.67 (House, 1986)[a]
Marital satisfaction index	.76	.78	.74 (House, 1986)
Reciprocity index	.65	.59	

[a] This was the published reliability for the 6-item self-efficacy index, of which only 5 items were included in the self-esteem/mastery index for the present research.

CHAPTER 5

STRUCTURAL EQUATION MODELING

Treatment of Missing Data

In constructing the covariance matrix for structural equation modeling using the maximal amount of data in the samples, two different methods were employed to account for the missing data. Mean substitution was used in making up the infrequently missing data for self-esteem, mastery, depression, and reciprocity. It enlarged the sample size to its maximum by reducing the missing data to zero or close to zero.

In dealing with the great amount of missing data (27.7% for Wave 1 and 30.5% for Wave 2) in marital satisfaction, a new variable was created to represent the product term of marital satisfaction and marital status. Since the marital measure was not administered to non-married caregivers, it was only the married caregivers who contributed to this new variable for the specific parameter estimation in the structural equation model. Univariate statistics for this product term variable are included in both Table 4.11 and Table 4.12 in the row labeled "product term." This product term variable reduced the missing value to zero and the resulting sample sizes for Wave 1 and Wave 2 were 236 and 271, respectively.

The Measurement Model

Confirmatory factor analysis was used to test the robustness of extracted factors in the context of underlying data structure of the Wave 2 sample and the validity of the measurement model to mirror the corresponding situation in the real world. The resulted

measurement model is shown in Figure 5.1. A covariance matrix derived from data in the Wave 2 sample by SPSS was analyzed as input data, and the model was tested using maximal likelihood procedure.

The maximal likelihood procedures of the confirmatory factor analysis were as follows: First, a single indicator was extracted when applicable (e.g., for social support, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity), and summary scale scores were used as single indicators to substitute each scale item as separate indicators. This strategy reduced the number of parameter estimations in a complex model, and is appropriate when individual factor item loading in the specific scale is high in exploratory factor analysis (Liang, Lawrence, Bennett, & Whitelaw, 1990).

Secondly, for all latent variables with single indicator (i.e., caregiver perceived stress, self-esteem/mastery, role enjoyment, marital satisfaction, reciprocity, social support, stressful life events, social roles, race, age, gender, and relationship with recipient), the measurements were assumed to be perfect (with 0% error). This estimation was considered to be conservative since increasing measurement errors would induce artificial correlation among the latent variables in the measurement model. Thus, a full factorial loading of 1.0 was assumed for all single indicators in the subsequent latent variables. For latent variables with multiple indicators (i.e., caregivers' burden, psychological function, and physical health), one factor loading was arbitrarily set to 1.0 to test the relative contribution of the rest factors. Error variances were not allowed to correlate, but all the latent variables were allowed to correlate with each other.

Results of the confirmatory factors analysis, as presented in column 3 of Table 5.1, indicated that the suitability of the measurement model for the data in which all

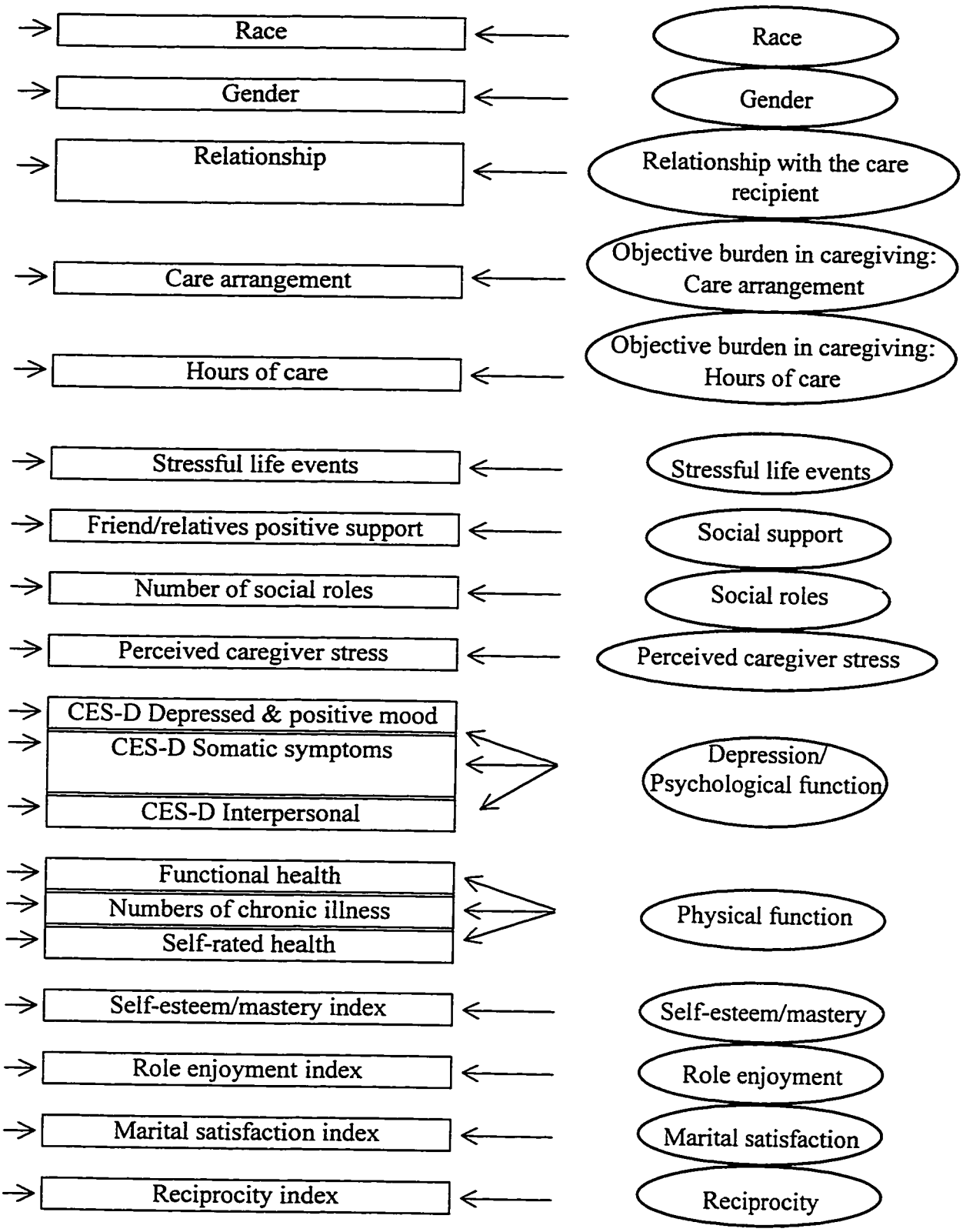


Figure 5.1. Measurement model predicting caregiver stress.

Table 5.1.

Standardized Factor Loadings and Measurement Error Variances for the Measurement Model Predicting Caregiver Stress

Latent variable	Indicators	Factor loading (Measurement error)
Objective burden in caregiving: Care arrangement	Care arrangement	1.00[a] (.00)[b]
Objective burden in caregiving: Hours of care	Hours of care	1.00[a] (.00)[b]
Stressful life events	Number of stressful life events	1.00[a] (.00)[b]
Social support	Friend/relatives positive support	1.00[a] (.00)[b]
Social roles	Number of social roles	1.00[a] (.00)[b]
Race	Race	1.00[a] (.00)[b]
Age	Age	1.00[a] (.00)[b]
Gender	Gender	1.00[a] (.00)[b])
Relationship with the care recipient	Relationship	1.00[a] (.00)[b]
Perceived caregiver stress	Perceived caregiver stress	1.00[a] (.00)[b]
Physical function	Functional health	.55[a] (.70)
	Numbers of chronic illness	.65 (.57)
	Self-rated health	.77 (.41)
Self-esteem/mastery	Self esteem/mastery index	1.00[a] (.00)[b]
Role enjoyment	Role enjoyment index	1.00[a] (.00)[b]

Table 5.1.continued

Latent variable	Indicators	Factor loading (Measurement error)
Marital satisfaction	Marital satisfaction index	1.00 [a] (.00)[b]
Reciprocity	Reciprocity index	1.00 [a] (.00)[b]
Depression	CES-D Depressed & positive mood	.75 [a] (.44)
	CES-D Somatic symptoms	.74 (.45)
	CES-D Interpersonal	.39 (.84)

Note. Factors and measurement errors were from the completely standardized solution. All factor loadings and measurement errors were significant at .01 level in the preliminary measurement model. [a]Parameter fixed to 1.0 in the unstandardized solution. [b]Parameter fixed to 0 in the unstandardized solution.

factor loadings were above 0.4 and significant ($p<.01$), accounted for at least 16% of the true score variance (Liang, 1986). The only exception was the "interpersonal" factor in depression with a factor loading of 0.39. Although it was slightly off from the required value of 0.4, it was still included because it is a well-established measure of depression. With the above criteria, the resulted goodness-of-fit statistics for the measurement model were good (X^2= 151.82; d.f. =64; p = .00; GFI= .95; AGFI= 0.83; RNI=.88, when compared to a null model that assumes no relationships among variables).

Correlations among latent variables are displayed in Table 5.2. They were derived from the confirmatory factorial analysis in Wave 2 sample. Occasional high correlations have been reported to be a result of severe collinearity (Bollen, 1989). However, this was not the case in the present study, even for the highest correlation (-0.64) between depression and physical function, which was not high enough to suggest any collinearity.

Table 5.2.

Correlations Among Latent Variables for Wave 2

	1	2	3	4	5	6	7
1. Race	-						
2. Age	.18**	-					
3. Gender	-.06	.04	-				
4. Relationship	.07	.44**	-.02	-			
5. Objective burden in caregiving: Care arrangement	-.11	-.11	-.02	.10	-		
6. Objective burden in caregiving: Hours of care	-.01	.26**	-.10	.31**	.36**	-	
7. Stressful life events	-.20**	.07	.08	-.05	.04	.00	-
8. Social support	.01	-.08	-.25**	-.01	-.07	-.07	-.15*
9. Social roles	-.09	-.59**	.08	-.39**	.06	.14*	-.04
10. Perceived caregiver stress	.12*	.12*	-.21**	.12*	.00	.17**	-.04
11. Depression	-.27**	-.08	-.13	.23**	.08	.02	.26**
12. Physical function	.12	-.34**	.12	-.31**	-.09	-.19**	-.11
13. Self-esteem/mastery	.13*	.05	.12*	-.05	-.11	-.06	-.13*
14. Role enjoyment	-.13*	-.05	-.03	-.04	-.03	-.04	-.02
15. Marital satisfaction	.19**	.00	.00	-.16**	-.11	-.04	-.03
16. Reciprocity	.06	-.31**	-.10	-.24**	.03	.00	-.02

* $p<.05$ **$p<.01$

Table 5.2 continued

	8	9	10	11	12	13	14	15
8. Social support	-							
9. Social roles	.12*	-						
10. Perceived caregiver stress	.00	-.07	-					
11. Depression	-.20**	-.19**	.19**	-				
12. Physical function	.13	.42**	-.19**	-.64**	-			
13. Self-esteem/mastery	.12	.12	-.15*	-.63**	.43**	-		
14. Role enjoyment	.18**	.23**	-.07	-.09	.12	.04	-	
15. Marital satisfaction	.04	.04	-.07	-.38**	.16*	.19**	.07	-
16. Reciprocity	.12*	.43**	.09	-.07	.23**	.05	.10	.09

* $p<.05$ **$p<.01$

Although the measurement model was reliable and was free from the problem of collinearity, the measurement model showed a significant of chi-square in referencing to degree of freedom (X^2=151.82; d.f.=64; p=.00). It should be noted that chi-square is preferred to be less than twice the degree of freedom and chi-square is expected to be non-significant in referencing to its degree of freedom in a structural equation model. However, the measurement model in my study did not meet these rules, in which may suggest either the exclusion of other important variables, the inclusion of useless latent constructs or the complexity of the model. However, the measurement model would still

served as a reference model since it was parsimonious the best of the reality unless any approximation problem appeared. Therefore, the goodness-of-fit statistics in the following models (1-5, final data-derived model) would not surpass the goodness-of-fit statistics of the measurement model.

Hypotheses Testing: The Structural Model Predicting Caregiver Stress

Preliminary Structural Model

The purpose of the model was to examine: (a) the direct path from objective burden of caregiving, stressful life events, social support, social roles, race, age, gender, and relationship with the care recipient to caregiver stress; (b) direct path from caregiver stress to physical function, self-esteem/mastery, role enjoyment, marital satisfaction and reciprocity; and (c) interrelated relationship among physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity.

The preliminary structural model (Figure 5.2) was initiated by the translation of the conceptual model illustrated in Figure 1.3 with individual paths among latent variables specified based on theoretical considerations. The purpose of this model was to test the effect of burden, stressful life events, social support, social roles, race, age, gender, and relationship with the care recipient on perceived caregiver stress, the impact of perceived caregiver stress on physical function, self-esteem/mastery, role enjoyment, marital satisfaction and reciprocity, and the relationship among outcomes. However, the overall fit of the model was below acceptance because chi-square in reference to its

degree of freedom was large and the p value of chi-square statistics was significant (X^2=870.89; d.f.=160; p=.00). Comparing to the fully saturated model (measurement model), the difference of chi-square statistics were big (ΔX^2=680.59; Δd.f.=96; p<.00) indicating this model was far from perfection. In addition, the absolute goodness of fit indices and comparative fit indices were less than .90 (GFI=.75; AGFI=.67; RNFI= .38) which also demonstrated inappropriate fit of the model. The parameter estimates for the preliminary model are shown in Figure 5.2

As indicated in Figure 5.2, hours of care and gender were the only latent variables that had significant impact on caregiver stress. More hours in caregiving and the gender of female predicted a higher level of perceived caregiver stress. Subsequently, caregiver stress predicted physical function and self-esteem/mastery. Greater perceived caregiver stress was associated with poor physical function and lower self-esteem/mastery. Objective burden in caregiving, including both care arrangement and hours of care, stressful life events, social support, social roles, race, age, gender, and relationship with the care recipient altogether explained only 9% of the variance in caregiver stress. Caregiver stress, in turn, only accounted for a very small amount of variance in physical function, self-esteem, role enjoyment, marital satisfaction, and reciprocity (3%, 2%, 1%, 0%, and 1%, respectively). In terms of the relationship among outcomes, physical health was remarkably related to self-esteem/mastery, marital satisfaction and reciprocity. Self-esteem was significantly related to marital satisfaction.

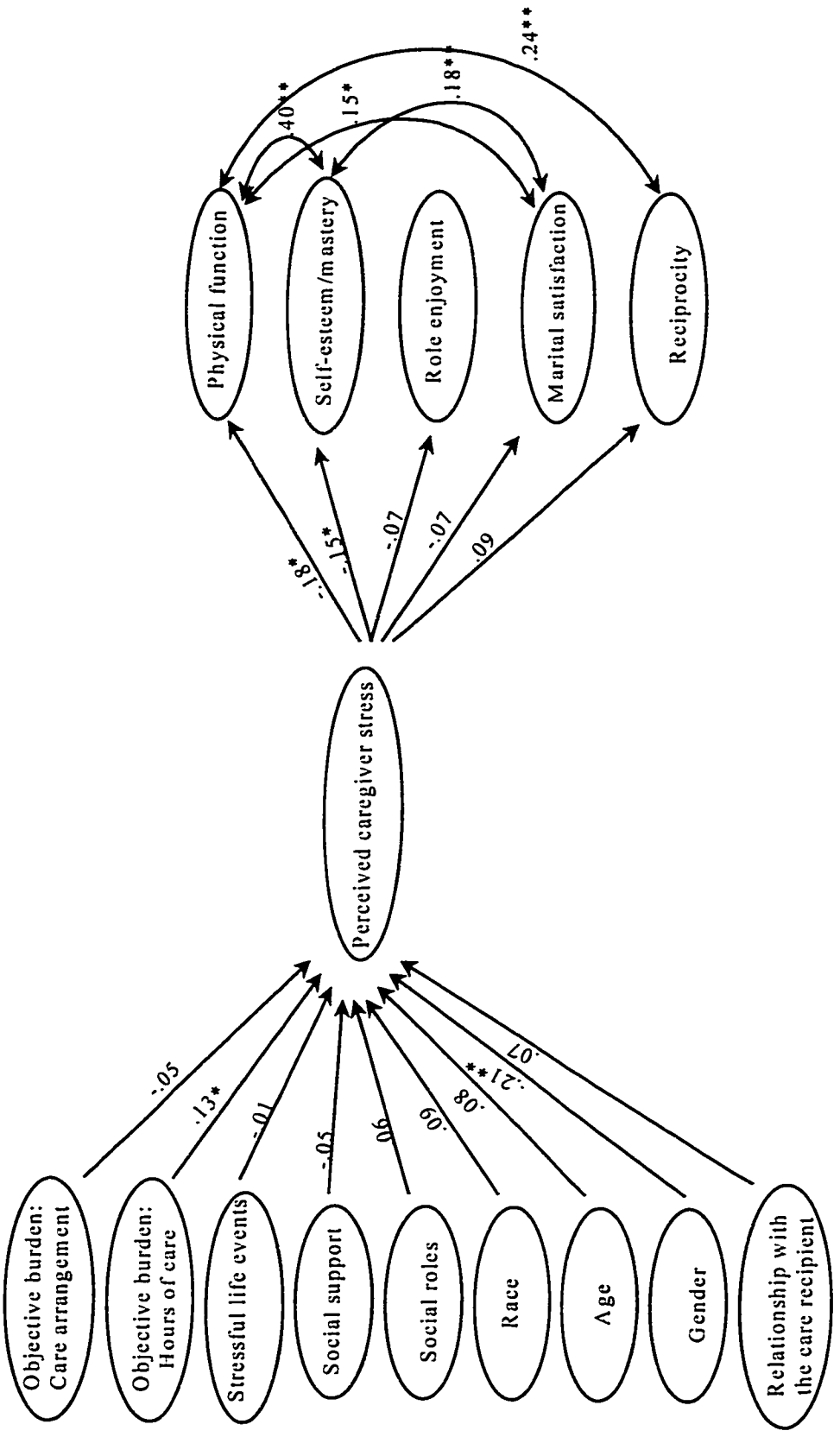


Figure 5.2. Preliminary structural model predicting caregiver stress. The hypothesized model assumed inter-related relations among adaptive modes. To reduce the complexity of the model, the insignificant paths among adaptive modes are not shown. * $p<.05$ ** $p<.01$

Second Structural Model

The purpose of the model is to examine the direct path from objective burden of caregiving, stressful life events, social support, and social roles to caregivers' physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity.

In modifying the preliminary model, the second model (Figure 5.3) was constructed to test the additional direct impact of caregivers' burden, stressful life events, and social support on caregivers' physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity by adding a direct path between them. The resultant overall fit of the second model was significantly improved from the preliminary model (ΔX^2=63.16; Δd.f.=25; p<.00) and was more parsimonious to measure model than preliminary model (ΔX^2=617.43; Δd.f.=71; p<.00). However, the overall fit of the model was still below acceptance because chi-square in referencing to its degree of freedom was large and the p value of chi-square statistics was significant (X^2=769.25; d.f.=135; p=.00). In addition, the absolute goodness of fit indices and comparative fit indices were less than .90 (GFI=.78; AGFI=.66; RNFI=.45) which also demonstrated inappropriate fit of the model. In addition, In comparison with the preliminary model, the effect of exogenous latent variables on perceived caregiver stress did not change after adding direct paths from objective burden, stressful life events, social support, and social roles to adaptive modes (i.e., physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity). Similar to the previous preliminary model, more hours of caregiving and

the gender of female were associated with greater perceived caregiver stress. In contrast, higher perceived caregiver stress not only predicted poor caregiver's physical function and lower self-esteem/mastery, but also predicted a higher level of reciprocity in the second model. The significant relationship among outcomes changed from the preliminary model, in which physical function was only related to self-esteem/mastery, while self-esteem/mastery was interrelated with marital satisfaction.

Hours of care, one of the objective burdens in caregiving, had an indirect effect on caregivers' physical function and mastery through perceived caregiver stress. The indirect effect of hours of care on caregivers' physical function, self-esteem/mastery, and reciprocity were -.02 [=(.13)*(-.16)], -.02 [=(.13)*(-.15)], and .01[=(.13*)*(.11)], respectively. Stressful life events, social support, and social roles had a direct effect only on adaptive modes. More stressful life events directly predicted lower self-esteem/mastery. A higher level of social support was associated with greater role enjoyment. More social roles were associated with better physical function, greater role enjoyment, and higher reciprocity. The results of the second model are summarized in Figure 5.4, which quantifies the significant direct effect and indirect effect of objective burden in caregiving, stressful life events, social support, and social roles on endogenous latent variables (perceived caregiver stress, physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity). Table 5.3 shows all standardized structural parameter estimates in the second model.

As in the preliminary model, caregiver burden, stressful life events, social support, social roles, race, age, gender, and relationship with the care recipient explained 9% of the variance in perceived caregiver stress. In contrast, perceived caregiver stress,

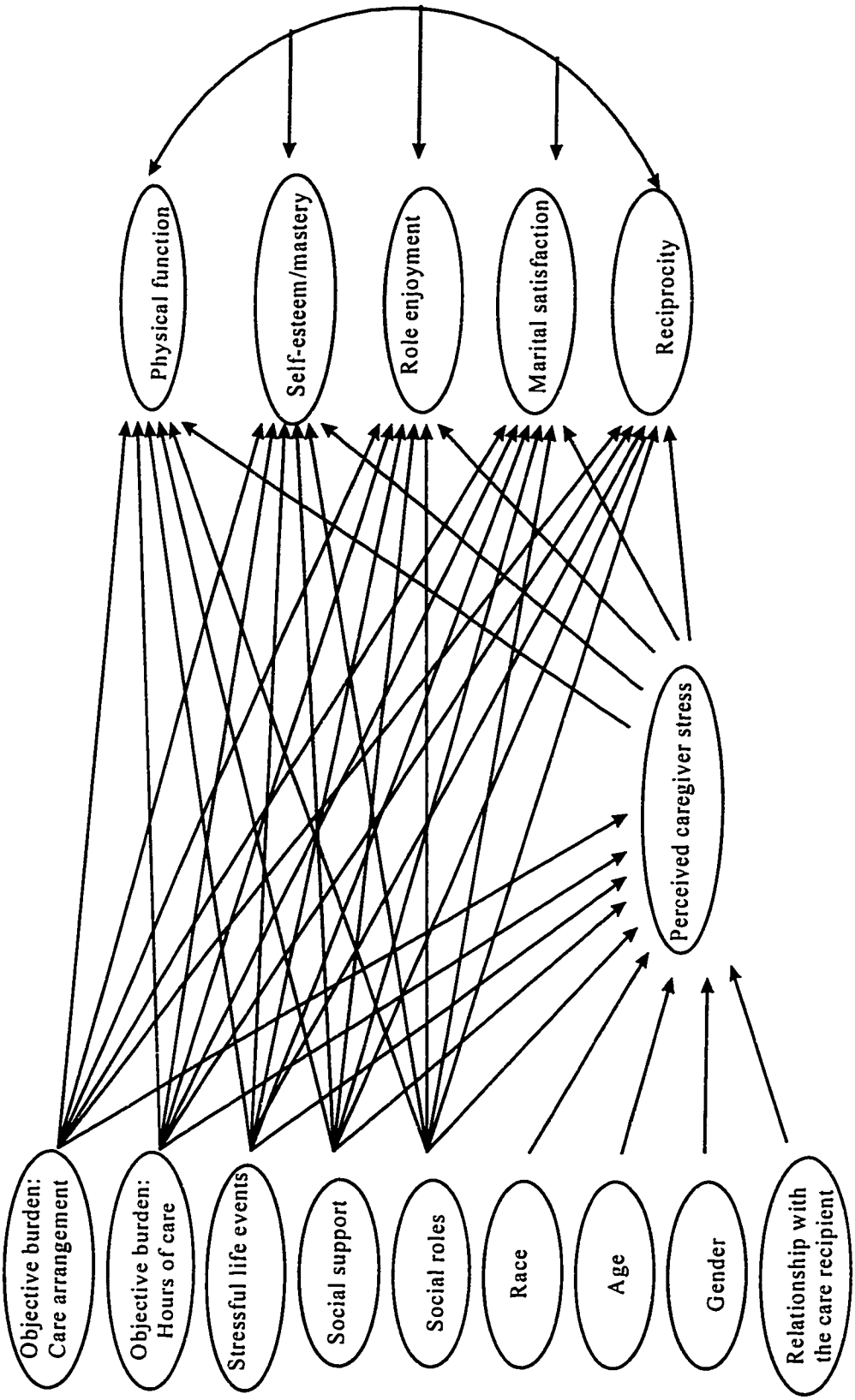


Figure 5.3. Second structural model predicting caregiver stress.

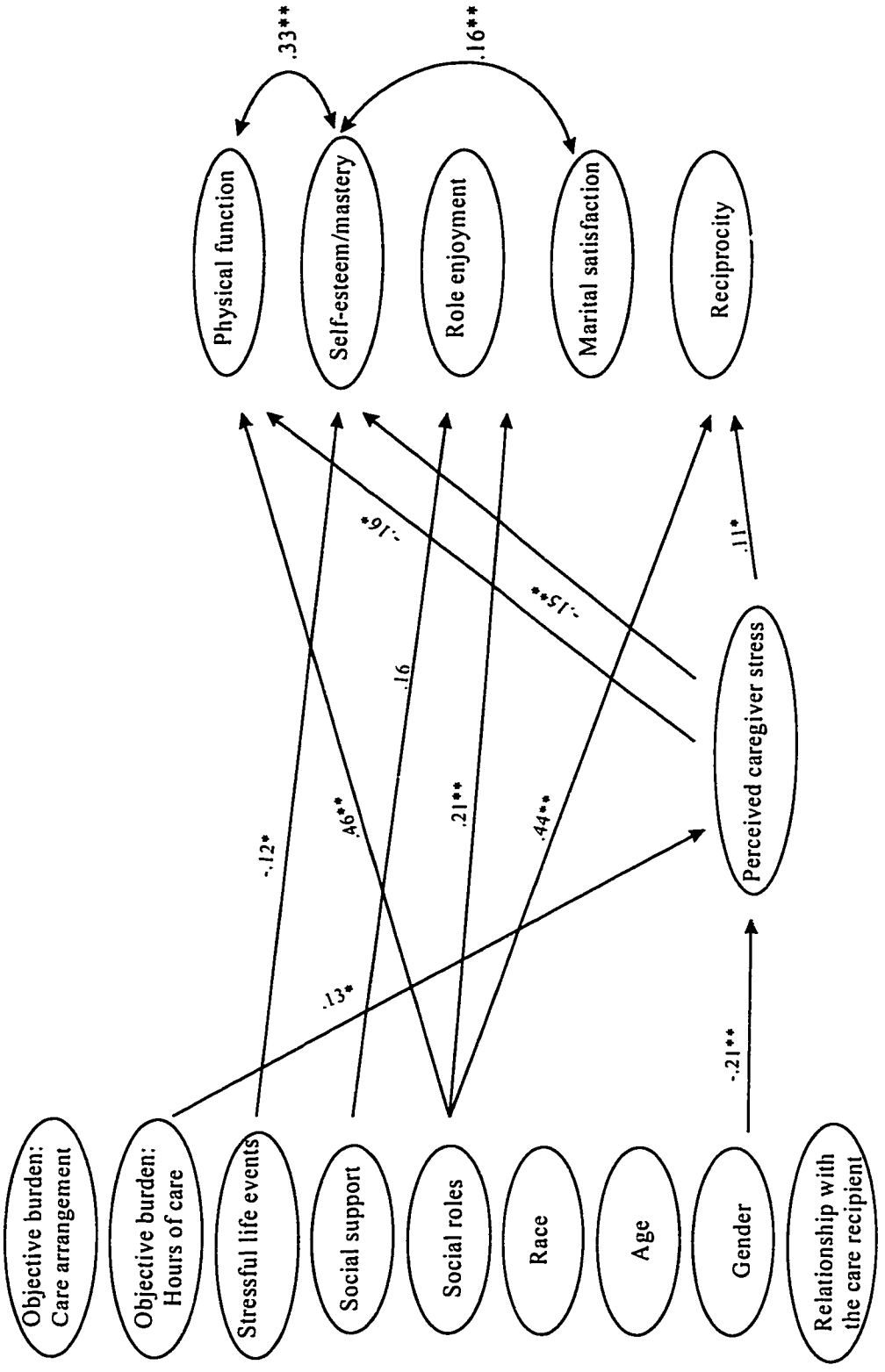


Figure 5.4. Standarized coefficient among latent variables in second model.To reduce the complexity of the model, the insignificant paths among adaptive modes are not shown. * p<.05 ** p<.01

Table 5.3
Standardized Structural Parameter Estimates for Second Structural Model Predicting Caregiver Stress

	Endogenous variables						
Latent variable	Caregiver Stress	Depression	Physical Function	Self-esteem/ Mastery	Role Enjoyment	Marital Satisfaction	Reciprocity
Exogenous latent variable							
Objective burden: care arrangement	-.05		-.08	-.11	-.05	-.12	-.01
Objective burden-hours of care	.13*	-	-.07	.02	.03	.02	.06
Stressful life events	-.01	-	-.09	-.12*	.01	-.03	.01
Social support	-.05	-	.05	.08	.16**	.02	.07
Social roles	.06	-	.46**	.10	.21**	.04	.44**
Race	.09	-	-	-	-	-	-
Age	.08	-	-	-	-	-	-
Gender	-.21**	-	-	-	-	-	-
Relationship with the care recipient	.07	-	-	-	-	-	-
Endogenous independent variable							
Perceived caregiver stress		-	-.16*	-.15**	-.06	-.07	.11*

Note. A dashed line represents a path that was not specified in the model.

*p<.05. ** P<.01

objective burden in caregiving, stressful life events, social support, and social role in all accounted for 25%, 6%, 7%, 2%, and 22% variance in caregivers' physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity. By adding the direct effect of environmental stimuli, the explained variances increased by 22%, 4%, 6%, 2%, and 21% in caregivers' physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity, respectively, from the preliminary model.

Third Structural Model

The purpose of the third model was to test the significance of depression in mediating between the perceived caregiver stress and adaptive mode as part of the coping mechanism.

The additional assumption in the third model was that depression was the result of immediate outcome of caregiver stress, and had a direct impact on caregivers' physical health, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity. As shown in Figure 5.5, the overall fit of the third model was also significantly improved from the preliminary model (ΔX^2 =141.67; Δ d.f.=1; $p<0.001$), was more parsimonious to measurement model than preliminary model (ΔX^2 =538.92; Δ d.f.=95; $p<0.00$). However, the goodness of fit statistics still showed inappropriate fit between model and data (X^2=690.74; d.f.=159; GFI=.79; AGFI=.72; RNFI=.54).

In contrast to the preliminary model, the presence of depression as a mediator between caregiver stress and outcomes changed the relationship among caregivers' outcomes. The prominent relationship between physical health and two adaptive modes,

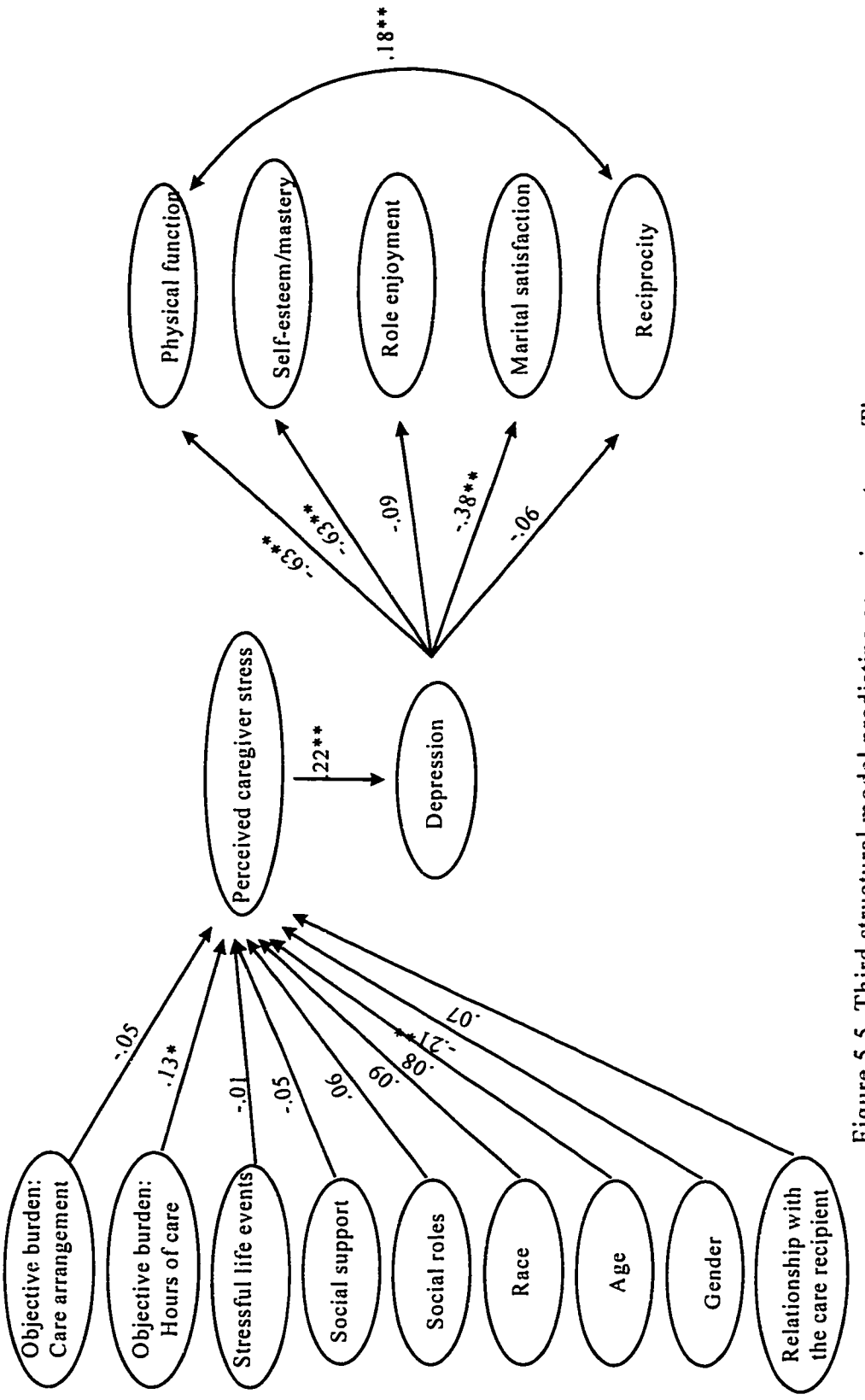


Figure 5.5. Third structural model predicting caregiver stress. The hypothesized model assumed inter-related relations among adaptive modes. To reduce the complexity of the model, only significant paths among adaptive modes are shown. * p<.05 ** p<.01

self-esteem/mastery and marital satisfaction, disappeared. Physical health was only significantly interrelated with reciprocity. In addition, self-esteem/mastery was not related to marital satisfaction in this model.

As in the preliminary model, more hours of care (one of the objective burdens in caregiving) and the gender of female predicted greater caregiver stress, and all exogenous latent variables accounted for 9% variance of caregiver stress as shown in Figure 5.5. In this model, depression mediated between perceived caregiver stress and caregivers' physical function, self-esteem/mastery, and marital satisfaction. Greater perceived caregiver stress was associated with higher depression. Caregiver stress accounted for 5% of total variance in depression. Higher levels of depression predicted poorer physical function, lower self-esteem/mastery, and lower marital satisfaction. Depression, in turn accounted for 40%, 40%, 1%, 15%, and 0% variance in physical health, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity, respectively.

Fourth Structural Model

The purpose of this model is to test the hypothesis that depression, as a specific psychological function, is an adaptive mode in the theory of caregiver stress.

Based on the previous models, the fourth model was raised to further test the role of depression as an adaptive mode in the theory of caregiver stress. As shown in Figure 5.6, the standardized coefficients indicated that the overall fit of this model was also

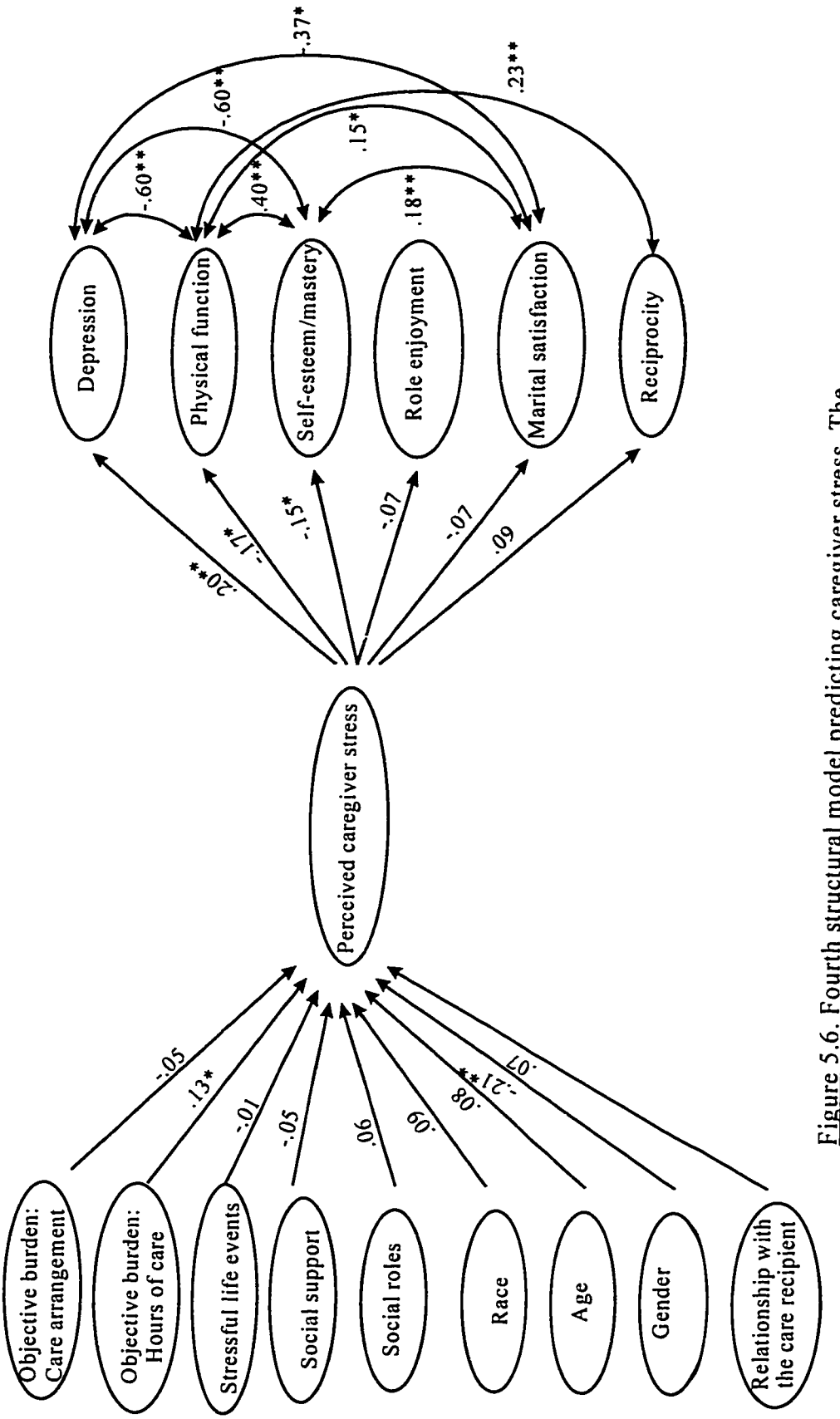


Figure 5.6. Fourth structural model predicting caregiver stress. The hypothsized model assumed inter-related relation among adaptive modes. To reduce the complexity of the model, only significant paths among adaptive modes are shown.

significantly improved from the preliminary model (ΔX^2 =147.1; Δ d.f.=6; p<.001) and was more close to measurement model than preliminary model (ΔX^2 =533.49; Δ d.f.=90; p<.00). However, the goodness-of-fit statistics still show inappropriate fit problem (X^2=685.31; d.f.=154; GFI=.78; AGFI=.69; RNFI=.52). The outcome in the presence of additional depression did not change any relationships among latent variables as compared to those in the preliminary model. Caregiver burden, stressful life events, social support, social role, race, age, gender, and relationship with the care recipient could still only account for 9% of variance in caregiver stress. Similar to previous models, more hours of care and the gender of female were associated with greater perceived caregiver stress. Subsequently, greater perceived caregiver stress predicted greater depression, poor physical function, and lower self-esteem/mastery. Still, caregiver stress accounted only for a small amount of variance in caregivers' outcome. To be specific, it accounted for 4%, 3%, 2%, 1%, and 0% variance in depression, physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity, respectively. In terms of the relationship among adaptive modes, physical function correlated to self-esteem/mastery, marital satisfaction, and reciprocity. Self-esteem/mastery was interrelated with marital satisfaction. In contrast to the preliminary model, depression was related to physical function, self-esteem/mastery, and marital satisfaction.

In order to examine the exact role of depression as either an adaptive mode or a part of the coping mechanism, the third and fourth models were contrasted. As shown in Table 5.4, the two models differed only slightly in their goodness-of-fit with significantly improved chi-square statistics for both models, as compared to the preliminary model

Table 5.4
Summary of Model Estimations

Model step	X^2	df	p	GFI	AGFI	RNFI	Comparison to Measurement Model X^2	df	p	Comparison to Preliminary Structural model X^2	df	p
Measurement model: Free covariance among all latent variables	151.82	64	.00	.95	.84	.88						
Preliminary structural model:	832.41	160	.00	.76	.69	.39	680.59	96				
1. Direct path from care arrangement, hours of care, stressful life events, social support, social roles, race, age, gender, and relationship with the care recipient to caregiver stress												
2. Direct path from caregiver stress to physical health, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity												
3. Free covariance among physical health, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity												

Table 5.4. continued

Model step	X^2	df	p	GFI	AGFI	RNFI	Comparison to Measurement Model X^2	df	p	Comparison to Preliminary Structural model X^2	df	p
Second structural model: Add direct path from burden, stressful life events, social support, and social roles to physical health, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity	769.25	135	.00	.78	.66	.45	617.43	71	.00	63.16	25	.00
Third structural model: Add depression as mediator between caregiver stress and physical health, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity	690.74	159	.00	.79	.72	.54	538.92	95	.00	141.67	1	.00
Fourth structural model: Add depression as one of the outcomes--psychological function	685.31	154	.00	.79	.71	.54	533.49	90	.00	147.1	6	.00

($p<0.001$). However the third model seems to be better than the fourth model, as demonstrated by both chi-square statistics and degree of freedom. Since an increase of one degree of freedom in Model 3 was associated with an increase of 141.67 in chi-square statistics, while a similar increase of 147.1 in chi-square statistics was associated with an increase of six degrees of freedom in Model 4. However, without further evidence, whether depression was part of the coping mechanism or was one of the adaptive modes could not be determined by comparing Model 3 with Model 4.

Fifth Structural Model

The purpose of this model is to test the interaction of contextual stimuli (stressful life events, social support, and social roles) and objective burden of caregiving and its impact on the perceived caregiver stress.

In order to test the interactive effect of objective burden in caregiving and contextual stimuli (stressful life events, social support and social roles) on perceived caregiver stress, new measurement and structural models were created with the above interaction terms. Each interaction term was the unexplained residual of a linear relationship between contextual stimuli (stressful life events, social support, or social roles) and objective burden in caregiving (hours of care or care arrangement), and product term of contextual stimuli and objective burden in caregiving.

The measurement model yielded an accepted fit (X^2=169.96; d.f.=88; p=.00; GFI=.96; AGFI=.83; RNI=.89) when compared to a null model that assumes no relationships among variables. The structural model with interaction terms is shown in Figure 5.7. The

goodness-of-fit statistics were below acceptable criteria as depicted in the following data: X^2=1101.58; d.f.=289; p=.00; GFI=.76; AGFI=.70; RNFI=.35. In addition, the model was far from perfectly parsimonious the measurement model (ΔX^2 =931.62; Δ d.f.=201; p<.00). Standardized structural coefficients were also displayed in Figure 5.7. As can be easily noted, none of the interaction terms were significant, which suggested that contextual stimuli (stressful life events, social support, and social roles) did not modify the relationship between objective burden in caregiving and perceived caregiver stress. Interaction terms did not change the relationship among latent variables as compared to those in the preliminary model. More hours of care, gender of female, and white caregiver were related with perceived caregiver stress, which in turn influenced physical function and self-esteem/mastery in the fifth model. In addition, physical function was related to self-esteem/mastery, marital satisfaction, and reciprocity. Self-esteem/mastery was interrelated with marital satisfaction in both models. In contrast, race had an impact on perceived caregiver stress in the fifth model, which had not been found in the preliminary model.

Caregiver burden, stressful life events, social support, social role, race, age, gender, and relationship between care recipient and interaction terms altogether accounted for 11% of the total variance in caregiver stress. Caregiver stress explained only a small amount of variance in caregivers' outcome. Caregiver stress accounted for 3%, 2%, 1%, 0%, and 1% variance in physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity respectively.

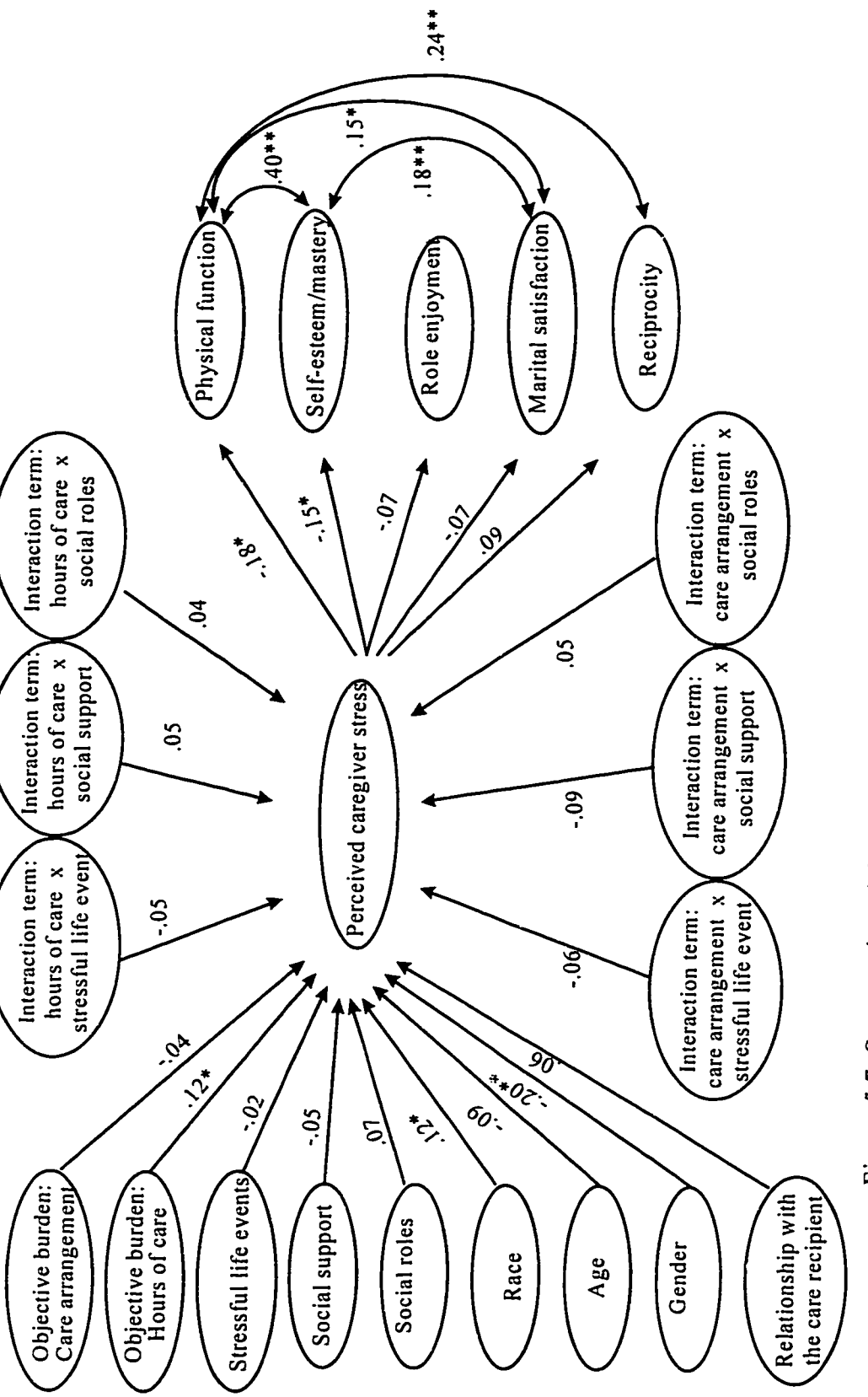


Figure 5.7. Structural model with interaction terms predicting caregiver stress. The hypothsized model assumed inter-related relation among adaptive modes. To reduce the complexity of the model, only significant paths among adaptive modes are shown. * $p<.05$ ** $p<.01$

Building a New Model that Predicts Caregiver Stress

The Final Data-Derived Model

The purpose of this model is to predict perceived caregiver stress based on the theoretical perspective and current data set.

In order to predict perceived caregiver stress, the final data-derived model was developed from the preliminary model on the basis of theoretical perspective and current data. The predicted caregiver stress from the preliminary structural model did not fit the current data set, which indicated that the middle-range theory of caregiver stress did not truly represent the phenomena of caregiving. Additional considerations were taken to include the direct effect of environment stimuli on adaptive modes, depression as mediator between perceived caregiver stress, and adaptive modes and depression as one separate adaptive mode in the previously described Models 2, 3, and 4, respectively. Even though there were significant improvements by introducing these factors, the overall predication was still poor. Therefore, the existing theory of caregiver stress needed to be further modified.

Previous models involved the standard application of structural modeling to test the existing theory. While developing the final data-derived model, an exploratory structural modeling method by the name of "specification search" was employed in Wave 2 sample. The exploratory structural modeling was introduced by Leamer (1978), Long (1983), and MacCallum (1986), and proved to be valid in situations where successive modification can be made on an arbitrary initial model to improve the parsimony and fit of the initial model.

In order to verify that the developed model fit the data best and that all parameters had real significance and substantive meaning, cross-validation was performed on the final data-derived model derived from a "specification search" using Wave 1 sample.

Specification Search to Build the Final data-derived model. Ideally, the causality among latent variables in a structural equation model is based on the propositions of a sounded theory. Without the guidance from the theory, there are many plausible models that could fit the data set. Therefore, it is necessary to have presumptions to lead the model-building process. In other words, the purpose of assumptions is to give some basic directions that guild the approximation process. There were three assumptions in this model. Assumption 1 reflected the assumption of RAM; assumption 2 was an assertion made in the RAM; assumptions 3 reflected the common notion of demographical information in the structural equation model. The three assumptions are:

(a) Environmental stimuli, such as objective burden in caregiving, stressful life events, social support, social roles, race, age, gender, and relationship with the care recipient are antecedents of adaptation;

(b) Depression, or psychological function is the outcome of perceived caregiver stress; and

(c) Residual stimuli, such as race, age, gender and relationship with the care recipient, are exogenous latent variables that are determined outside of the model.

First, the measurement model was constructed on the Wave 2 sample with all possible correlation among latent variables (X^2=151.82; d.f.=64; p=.00; GFI=.95; AGFI=.83). However, the relationship among the latent variables cannot be clearly

interpreted. Various exploratory structural models were then constructed based on the preliminary model by adding and/or dropping certain pathways between the specified latent variables. The preliminary model and the subsequently tested exploratory models are summarized in Appendix A. A path was added if the resultant modification index was high, while a path was dropped when the path coefficient was insignificant. As a result, several paths were dropped from the preliminary model from Step 3 to Step 19 based on a Z value less than 1.96 ($p>.05$), while the model estimation did not change significantly ($\Delta X^2 < 3.84$; Δ d.f.=1; $p>.05$) from the previous model each step but significantly different from the initial measurement model. Up to Step 19, the goodness-of-fit statistics were not significantly different from the preliminary model (Step 2): X^2=897.55; d.f.=177; p=.00; GFI=.74; AGFI=.69; RNFI=.36; ΔX^2 =26.66; Δ d.f.=17; $p>.05$.

After all the insignificant paths had been dropped, the necessary paths were added on each step to improve the goodness-of-fit statistics based on the modification index until an insignificant path was encountered. The insignificant path was then dropped by the previously described procedure. The model building process continued until no significant path could be added and no insignificant path could be dropped, the final data-derived model was thus uncovered.

The resulting final data-derived model (Step 59) is shown in Figure 5.8. It had a good fit to the data (X^2=247.11; d.f.=153; p=.00; GFI=.92; AGFI=.89; RNFI=.99), and was close to that of the measurement model, with an insignificant difference (ΔX^2 =95.29; Δ d.f.=89; $p>.05$). In other words, the final data-derived model was able to predict caregiver stress, while reproducing the goodness-of-fit of the measurement model.

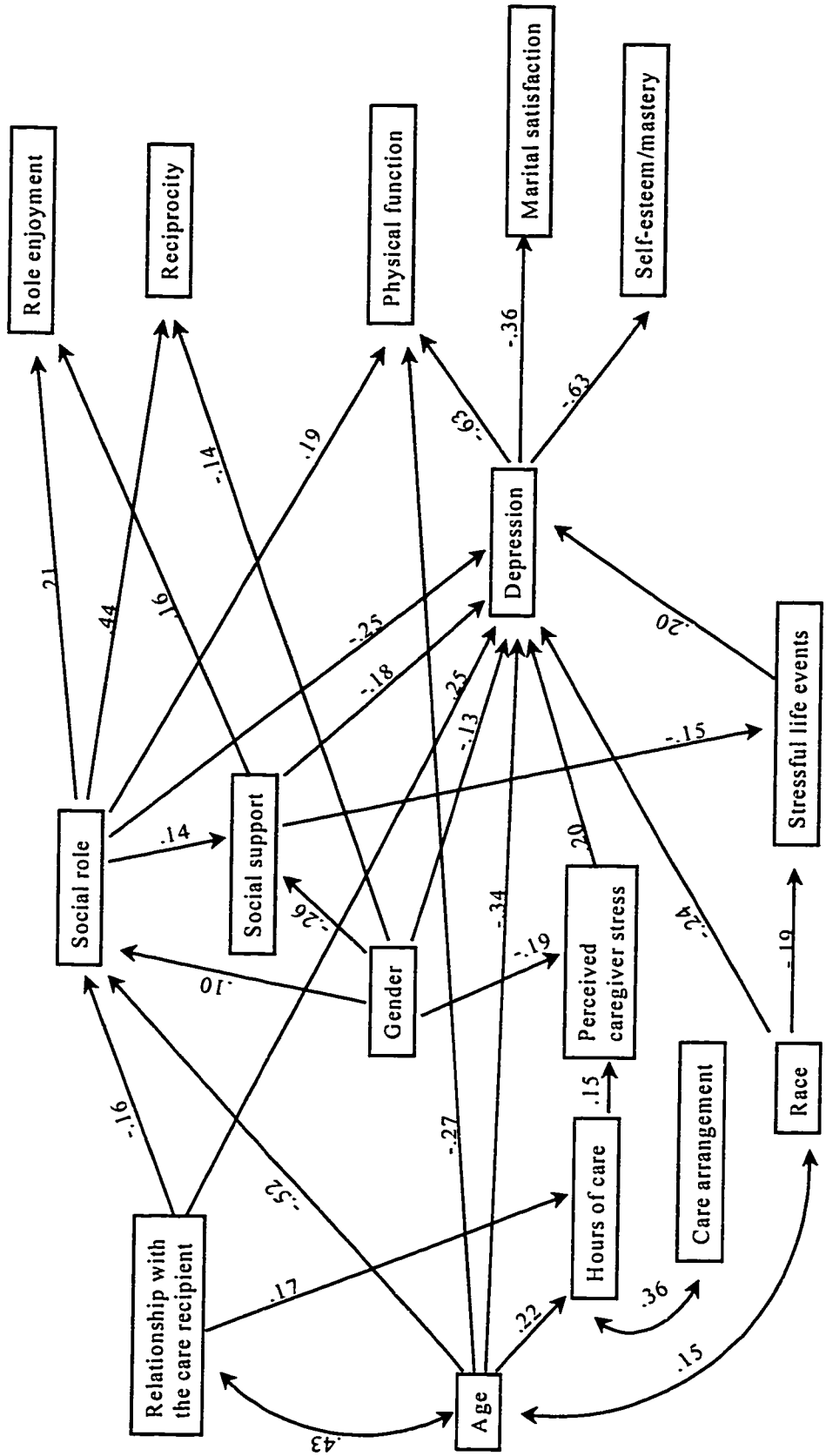


Figure 5.8. The final data-derived model predicting caregiver stress.

The strength and direction of the relationships among the latent variables were revealed by the standardized coefficients in Figure 5.8. The final data-derived model accounted for 6%, 36%, 58%, 40%, 8%, 13%, and 20% variance in perceived caregiver stress, depression, physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity.

As indicated in Figure 5.8, there were prominent relations among different factors of environment stimuli. Hours of care and care arrangement were related to each other and the former was predicted by age and relationship with the care recipient. Older caregivers provided more hours of care than younger caregivers. Spouse caregivers tended to provide more hours of care than nonspouse caregivers. White caregivers were usually older in age, while elderly caregivers were more likely to be the spouse of the care recipient. In contrast, nonspousal, younger, and male caregivers were more likely to assume additional social roles. Social support was predicted by gender and social roles. More social roles enable the caregiver to obtain more social support. Male caregivers usually received less social support. White caregivers tended to have less stressful life events than caregivers of other races.

Being female caregivers and giving more hours of care made the caregiver more susceptible to perceived caregiver stress. Being White, older, male, and nonspousal caregiver, and having less perceived caregiver stress, more social roles, more social support, and fewer stressful life events led directly to lessened chances of depression. Older in age, fewer social roles, and higher levels of depression tended to result in poor physical function. Greater depression was also associated with less self-esteem/mastery and less marital satisfaction. More social roles and more social support enabled

caregivers to experience a high level of role enjoyment. Male caregivers and caregivers with more social roles were less able to reciprocate.

Cross-validation. In order to test the robustness of the paths across the samples, the final data-derived model was cross-validated with both Wave 1 and wave 2 samples. Five comparisons between Wave 1 and wave 2 samples were made at different levels to examine the detailed structure of the final data-derived model. These comparisons were directed to test the equivalence in factor pattern, parameter between endogenous variables (beta linkage), parameter between exogenous variables and endogenous variables (gamma linkage), error variances, and factor variances.

The results from the comparison are summarized in Table 5.5. An initial reference was obtained by allowing all the estimated parameters to vary freely across groups. Step 1 was to test whether the factor patterns of the two waves were equivalent. The results showed an significant change in chi-square ($\Delta X^2 = 10.65$; Δ d.f.=4; $p<.05$); thus the factor loadings can not be assumed to be invariant across groups. Step 2, a test of whether the paths between endogenous variables were equivalent across groups (beta linkage) results in an significant model fit ($\Delta X^2 = 33.62$; Δ d.f.=14; $p<.01$). A test of the equivalence of the paths between exogenous variables and endogenous variables (gamma linkages) was assessed with Step 3. The results showed that gamma linkages also have significant difference in the two waves ($\Delta X^2 = 26.03$; Δ d.f.=14; $p<.05$). Therefore, Step 2 and Step 3 assuming equivalence of all path coefficients were rejected. The structural relations were not invariant between these two groups. Step 4, testing whether error variances were

equal between the two waves resulted in an insignificant model fit ($\Delta X^2 = 6.65$; Δ d.f.=6; $p>.05$), thus the error variance could be assumed to be equal for both waves. Finally, Step 5, testing that the factor variances were invariant across groups, showed that the chi-square statistics were worse than that of the previous model ($\Delta X^2 = 39.54$; Δ d.f.=19; $p<.01$), meaning that factor variances were not the same for Wave 1 and Wave 2.

To further investigate the differences between Wave 1 and Wave 2, especially in the Gamma and Beta linkage, this study examined each path individually. The results showed that the differences were rested on the linkage between gender and reciprocity, race and depression, stressful life events and depression, and depression and physiological function. These four paths need to be further examined and validated. However, most of the paths were equivalent in two waves, indicating that the final data-derived model might apply to both Wave 1 and Wave 2 data.

Power analysis

The purpose of power analysis is to determine the confidence level in rejecting a false null hypothesis (MacCallum, Brown & Sugawara, 1996). The second model, with the direct effect of stimuli on adaptive modes, was the most complex model in this study. It had 75 parameters and the ratio of parameter to cases was 3.6. In the terminology of power analysis, the difference between root-mean-square error of approximation (RMSEA) for the null model and the alternative (second) model reflects the effect size. The power is a function of case number, degree of freedom of the null model, and effect size. With RMSEA=.14 for null model and RMSEA=.13 for the second model, the effect size was 0.01. The resultant power was 0.70, with the number of cases = 271, alpha level

= .05, and the degree of freedom of null model = 190. In other words, the probability of rejecting an incorrect null hypothesis was .70.

Table 5.5.

Summary of Cross-Validation for the Final Data-Derived Model

Steps and Purpose		x^2	df	p	Comparison to previous model: Δx^2	Δ df	p
Step 0	Factor loadings, path coefficients, factor variance, and covariance were all set to be inequality across group	714.91	306	.00			
Step 1	Constrain factor loadings	725.56	310	.00	10.65	4	<.05
Step 2	Constrain factor loadings, and the paths between endogenous variables (beta linkages)	759.18	324	.00	33.62	14	<.01
Step 3	Constrain factor loadings, the paths between endogenous variables (beta linkages), and the paths between exogenous variables and endogenous variables (gamma linkages)	785.21	338	.00	26.03	14	<.05
Step 4	Constrain factor loadings, path coefficients, and error variance	791.86	344	.00	6.65	6	n.s.
Step 5	Constrain factor loadings, path coefficients, error variance, and factor variance	831.40	363	.00	39.54	19	<.01

Summary of Structural Equation Modeling Results

Findings from Comparison of the Preliminary Model and Hypothesized Models 2-5

Direct effect of focal stimuli, contextual stimuli and residual stimuli on adaptive modes. Aiming to test the hypothesized theory on caregiver stress, the preliminary model based on the RAM failed to account for the observations in Wave 2 data. Objective burden in caregiving, stressful life events, social support, social roles, race, age, gender, and relationship with the care recipient were initially hypothesized to have a direct effect on perceived caregiver stress and an indirect effect on adaptive modes in the theory of caregiver stress. The results showed that only hours of care, one of the objective burdens, and gender had significant impact on perceived caregiver stress, which in turn had a direct effect on physical function, self-esteem/mastery. The second model differed with the preliminary model in the direct effect of environmental stimuli on adaptive modes. Results showed that objective burden in caregiving only had an indirect effect on adaptive modes through perceived caregiver stress. Stressful life events, social support, and social roles, on the other hand, only had a direct effect on adaptive modes. The explained variance in adaptive modes and X^2 statistics increased significantly after adding these direct paths.

Role of depression. The third model assumed that depression was the direct outcome of perceived caregiver stress and manifested the coping mechanism. In other words, depression was added in the third model as a mediator between perceived caregiver stress and adaptive modes. As an alternative adaptive mode, depression was further postulated in the fourth model. As a result, goodness-of-fit statistics and accounted variance in adaptive modes of the third and fourth models were significantly

improved as compared to the preliminary model, suggesting the significant role of depression in predicting caregiver's outcome.

Although they both had similar X^2 statistics, Model 3 was better than Model 4 in the number of freedoms involved, which were 1 and 6 for Models 3 and 4, respectively. Accountable variance in adaptive modes was also greatly increased in the third model, indicating the more important role of depression over perceived caregiver stress in predicting adaptive modes. And the role of depression as mediator between perceived caregiver stress and adaptive modes suggested by third model was later proved in the final data-derived model, developed by exploratory structural modeling.

Interaction between focal stimuli and contextual stimuli on coping mechanism. With the addition six interaction terms, the fifth model did not significantly increase the accounted variance over the preliminary model. The addition of these interaction terms slightly increased the percentage of accounted variance in perceived caregiver stress. None of the interaction terms could predict perceived caregiver stress. In other words, stressful life events, social support, and social roles had no impact on the relationship between objective burden in caregiving and perceived caregiver stress.

Findings from the Final Data-Derived Model

Direct effect of focal stimuli on coping mechanism. In addition to the previously found effect of focal stimuli in the preliminary model, the final data-derived model further showed that the care arrangements and hours of care were strongly related to each other, which was not hypothesized in the preliminary model.

Effects of contextual stimuli on coping mechanism. Similar effects of contextual stimuli on the coping mechanism were found in both the final and the preliminary

models. None of the contextual stimuli in terms of stressful life events, social support, and social roles could predict perceived caregiver stress.

Direct effects of contextual stimuli on adaptive modes. Consistent with the second model, direct effect of contextual stimuli in terms of stressful life events, social support, and social roles on caregivers' adaptive modes was also demonstrated in the final data-derived model. Social roles had a direct effect on physical function, role enjoyment, and reciprocity in both models. Social support also directly predicted role enjoyment in both models. However the final data-derived model differed from the second model in smaller details. Stressful life events had a direct impact on self-esteem/mastery in the second model, while depression mediated the relationship between stressful life events and self-esteem/mastery in the final data-derived model. Moreover, all the contextual stimuli demonstrated an indirect effect on physical function, marital satisfaction, and self-esteem/mastery through depression in the final data-derived model, but this effect was absent in the second model.

Direct and indirect effect of residual stimuli on perceived caregiver stress. Both the final and preliminary models showed that gender predicted caregiver stress. However, the final data-derived model suggested that some residual stimuli, such as age and relationship with the care recipient, has an indirect effect on perceived caregiver stress through objective burden in caregiving.

Direct and indirect effect of residual stimuli on depression and on adaptive modes. Unlike the preliminary model, the final data-derived model indicated that depression was caused by all the residual stimuli including race, age, gender, and relationship with the care recipient. Moreover, age predicted physical function and gender influenced

reciprocity.

The mediator role of contextual stimuli on the relationship between residual stimuli, and coping mechanism and/or adaptive modes. Unique to the final data-derived model, contextual stimuli in terms of stressful life events, social support, and social roles was found to mediate between residual stimuli and coping mechanism, and between residual stimuli and adaptive modes. Race had an indirect effect on depression through stressful life events. Gender indirectly predicted depression and role enjoyment through social support. Age, gender, and relationship with the care recipient also had indirect effects on depression, physical function, role enjoyment, and reciprocity through social roles.

The role of depression. Consistent with the third model, depression was found as the mediator between perceived caregiver stress and several adaptive modes in the final data-derived model. Perceived caregiver stress significantly predicted physical function, self-esteem/mastery, and marital satisfaction through depression in both models. In contrast, all the stimuli, except objective burden in caregiving, had direct impact on depression only in the final data-derived model.

Relationships among adaptive modes. Physical function, self-esteem/mastery, role enjoyment, marital satisfaction, and reciprocity were hypothesized to be interrelated in the preliminary model. The significant paths among adaptive modes in the preliminary model disappeared by adding either paths from residual stimuli, contextual stimuli, or depression to adaptive modes in the final data-derived model.

CHAPTER 6

DISCUSSION

Although many nursing researchers use the Roy Adaptation Model to guide their studies, few empirically test its propositions using family caregiver experience with a chronically ill relative. A middle-range theory of caregiver stress was developed in this study to address the infrastructure. Derived from the RAM, the theory hypothesized that objective burden in caregiving would be the most important stimulus that might lead to perceived caregiver stress. Higher perceived caregiver stress would result in ineffective responses, such as poor health function, lower self-esteem/mastery, lower role enjoyment, lower marital satisfaction, and less ability to reciprocate. These adaptive modes should be interrelated, and not strictly orthogonal, in a caregiver's response to perceived caregiver stress. When caregivers perceived stress from caregiving, one of his/her responses might have an effect on the other. Although they might not be the most succinct and independent set of modes, altogether they should give a rather complete picture of a caregiver's response to perceived caregiver stress. On the other hand, depression might be the direct outcome of perceived caregiver stress manifesting either caregivers' coping mechanism or caregivers' adaptive modes. The present study also postulated that contextual stimuli, such as stressful life events, social support, social roles, and other residual stimuli would influence perceived caregiver stress either by having a direct impact on perceived caregiver stress or by modifying the relationship between objective burden in caregiving and perceived caregiver stress. However, statistical analysis on empirical data using the structural equation model did not support the initial RAM-

derived theory. Therefore, in order to resolve the unfitting model predication on empirical data, the primary model was modified by reevaluating the relations among tested constructs in empirical data using structural equation modeling. The robustness of the adjusted model was further cross-validated with another sample.

This chapter are organized into 6 sections: (a) Briefly summary of structural equation model results; (b) Evaluation of the preliminary model predicting caregiver stress; (c) The linkage between the data-derived model and the proposed theory; (d) Important findings of this study and discussion; (e) Limitations; and (f) Implications and recommendations for further research and interventions.

Briefly Summary of Structural Equation Modeling Results

Effect of focal stimuli, contextual stimuli and residual stimuli on coping mechanism. Focal Stimuli (objective burden in caregiving), contextual stimuli (stressful life events, social support, social roles) and residual stimuli (race, age, gender, and relationship with the care recipient) were initially hypothesized to have a direct effect on coping mechanism (perceived caregiver stress) in the proposed theory. However, both preliminary model and the final data-derived model showed that only one of the focal stimuli (objective burden in caregiving: hours of care) directly impact on coping mechanism (perceived caregiver stress). The final data-derived model further showed that the care arrangements and hours of care were strongly related to each other, which was not hypothesized in the preliminary model.

Contextual stimuli (stressful life events, social support and social roles) were proposed to have a direct impact on coping mechanism (perceived caregiver stress).

Similar findings were shown in both the preliminary model and the final data-derived model. None of the contextual stimuli in terms of stressful life events, social support, and social roles could predict perceived caregiver stress in both models.

The study also proposed that the residual stimuli (race, age, gender and relationship with the care recipient) influenced coping mechanism (perceived caregiver stress). Either the preliminary model or the final data-derived model showed that gender predicted caregiver stress. However, the final data-derived model suggested that some residual stimuli, such as age and relationship with the care recipient, has an indirect effect on perceived caregiver stress through objective burden in caregiving, which were not investigated in the preliminary model.

Effect of focal stimuli, contextual stimuli and residual stimuli on adaptive modes. The proposed theory assumed that there were no direct effects of environmental stimuli on adaptive modes (physical function, self-esteem/mastery, role enjoyment, marital satisfaction and reciprocity). Since the preliminary model was derived from this proposed theory, no direct relations between environmental stimuli and adaptive modes were investigated. In the final data-derived model, all environmental stimuli except focal stimuli were found to have direct effect on adaptive modes.

The mediating role of the coping mechanism. The theory posited that environmental stimuli influenced adaptive modes through coping mechanism. The results showed that only one of the objective burdens (hours of care), and one residual stimulus (gender) had a significant impact on perceived caregiver stress, which in turn had a effect on physical function, self-esteem/mastery and marital satisfaction.

Although the theory proposed that the coping mechanism (perceived caregiver

stress) predicted all the adaptive modes, both preliminary and final data-derived models showed that coping mechanism (perceived caregiver stress) only influenced some adaptive modes (physical function, self-esteem/mastery and marital stimuli). The coping mechanism had an impact on these three modes directly in the preliminary model. Depression mediated the relationships between environmental stimuli and these three adaptive modes in the final data-derived model.

Inter-related relationships among adaptive modes. The theory proposes that the adaptive modes (physical function, self-esteem/mastery, role enjoyment, and marital satisfaction and reciprocity) were interrelated. The preliminary model showed that (a) physical function was related to self-esteem/mastery, marital satisfaction and reciprocity; and (b) self-esteem/mastery related to physical function and marital satisfaction. The final data-derived model, on the other hand, demonstrated that these adaptive modes (physical function, self-esteem/mastery, role enjoyment, and marital satisfaction and reciprocity) were not related to each other at all. Their associations were explained by the presence of depression. In addition, role enjoyment and reciprocity were not related to any modes in the final data-derived model.

The role of depression. The proposed theory assumed that depression was the immediate outcome of perceived caregiver stress. Since the preliminary model was not aimed to test this hypothesis, no information was showed in the preliminary model regarding the role of depression. The final data-derived model showed that depression mediated relationship between the coping mechanism and three adaptive modes (physical function, self-esteem/mastery, and marital satisfaction). Depression also mediated relationships between three adaptive modes (physical function, self-

esteem/mastery, and marital satisfaction) and all environmental stimuli except focal stimuli.

Evaluation of the Preliminary Model Predicting Caregiver Stress

Several reasons may cause the improper fit between the preliminary model and the empirical data presented by this study. There are two major alternative explanations in explaining the unfitting problems: the derived middle range theory of caregiver stress simply does not work properly in the chronic caregiving situation or the empirical indicators fail to represent the theoretical constructs in the context of chronic caregiving. To explore these alternative explanations to the unfitting problem between the preliminary model and the empirical data presented in this study, the following discussion is based on Action, Irvin and Hopkins's (1991) criteria to reevaluate proposed the middle range theory of caregiver stress.

There are 15 criteria to examine a theory-testing research (Action et al.,1991): (a) clearly express that the purpose of the study is to examine the empirical validity of the constructs, concepts, assumptions, or relationships from the identified theory of reference; (b) explicitly describe and summarize the theory of reference; (c) theoretically define the constructs and concepts; (d) include an overview of previous studies based on the theory of reference in the review of the literature; (e) logically derive the research questions or hypotheses from the definitions, assumptions, or the propositions of the theoretic frame of reference; (f) ask appropriate research questions or hypotheses that are specific enough to put the theory of reference at risk for falsification; (g) clearly derive operational definitions from the theory of reference; (h) use the study design that is

congruent with the level of theory described in the theory of reference; (i) use the instruments that are theoretically valid and reliable; (j) select a sample based on the theory of reference; (k) use the appropriate statistics; (l) use adequate data analysis techniques to provide evidence for supporting, refuting, or modifying the theory; (m) include an interpretive analysis of the findings in relation to the theory being tested; (n) discuss the significance of the theory for nursing in the study; and (o) make recommendations for further research based on the theoretic findings. Based on these criteria, the present study showed that it met some of the criteria by explicitly stating the theory-testing nature of the study, presenting and summarizing the RAM, defining the constructs and concepts theoretically, reviewing previous studies related to RAM, deriving concept from the statement of RAM in the middle range theory of caregiver stress, deducing the research hypotheses from the statement of the middle range theory of caregiver stress, using falsifiable and justifiable hypotheses, using model testing designs which are appropriated for the purpose of this study, using the most stringent statistics-structural equation modeling, performing adequate data analysis techniques, including an interpretive analysis of the findings in relation to the theory of reference, discussing the significance of the theory for nursing, and including recommendations based on the theoretical findings for further research.

The following criteria will be discussed in great detail in the area of delineating operational definitions, and selecting the study instruments and sample. The problem for not meeting these criteria perfectly is largely due to the design of this study. This study employed a secondary data analysis strategy. Secondary data analysis offers several theoretical as well as practical advantages. However, utilizing secondary data also has its

disadvantages. The secondary analyst often encounters the problem of adjusting the fit between the theoretical definition and operational definition. Therefore, a secondary analyst might need to make some compromise to obtain a suitable definition, giving the definition suitable for the purpose of the study. In this present study, several operational definitions were chosen to represent theoretical definitions although they did not perfectly match the theoretical definitions. For example, although quality of social support in several relationships were measured in this data set, including parents', child's, spouse's and friend's/relative's support and demand, this study only used friends/relative support and demand to represent social support instead of a broad scope social support or multiple indicators to avoid the possible confounding effect and to increase the power of prediction as discussed in chapter 3. Such an approach may jeopardize the efforts to match the operational definition with theoretical definition.

In terms of instrumental issues, choosing measures to represent theoretical definitions in secondary data analysis also need to make some compromises because of statistical considerations. For example, exogenous variables and some endogenous variables in this study were designed to have single indicator to minimize the number of parameters. Also, this study investigated the interaction effect of contextual stimuli, it will reduce the complexity by using only single indicators for exogenous variables. Therefore, for all latent variables with single indicator, the measurements were assumed to be perfect. That is, the reliability of a single latent variable was assumed to be perfected. Such an approach is considered to be conservative to avoid overestimating the relationship among latent constructs. However, it scarifies the opportunity to examine various faces of the theoretical constructs and runs the risk of underestimating

relationships among theoretical constructs.

Finally, a secondary data analyst has less chance to select a desired sample since the available data sets are limited in his/her area of interest. In addition, a data set may have been fully used by investigators who conducted the study before it was released to the public. Therefore, the secondary analyst might not be able to examine her/his area of interest using an up-to-date data set. In this present study, the purpose was to build a theory predicting caregiver stress using 1989 ACL data set and further verifying findings with the 1986 ACL data set. Since this study did not use a contemporary data set, the resultant model needs to be further tested and modified when applying it to current phenomena.

The Linkage Between the Data-derived Model and the Proposed Theory

Due to the inappropriate fit between the proposed preliminary model and the data set, the model was modified by "specification search" using the 1989 ACL data set and further verifying by 1986 ACL data set. The final data-derived model showed that reciprocity and role enjoyment were not related to caregiving related constructs, such as objective burden and perceived caregiver stress directly or indirectly. Relationships among the rest of the constructs did not change when these two latent variables were removed from the final data-derived model. They were not considered to be outcomes of caregiving. In attempt to simply the final data-derived model, these two constructs were removed from the final data-derived model. The final model is shown in Figure 6.1. Obviously, latent constructs in the final model acted differently from the preliminary model. In particular, race, age, gender and the relationship with the care recipient

performed as contextual stimuli since their roles in predicting perceived caregiver stress were clearly demonstrated in the final model. Depression was added as one of the adaptive modes that provided additional information other than the other adaptive modes. The conceptual-theoretical structure was revised according to the final model and is shown in Figure 6.2.

The theoretical propositions (See Table 1.2) in the middle range of caregiver stress were also revised based on the final model.

Revised Theoretical Propositions

1. Caregivers' objective burden leads to perceived caregiver stress. It might be the most immediate factor confronting caregivers in the beginning of caregiving. However, it is not the most important stimulus leading to perceived caregiver stress over a long period in a chronic caregiving situation.

2. High perceived caregiver stress results in ineffective responses: higher level of depression (lower level of psychological function).

3. Depression (psychological function), physical function, self-esteem/mastery and marital satisfaction, are the responses of caregiving. Physical function, self-esteem/mastery and marital satisfaction are related due to the fact that they result from the caregiver's depression (psychological function).

4. Depression, as psychological function, is the most easily aroused response of perceived caregiver stress. It intervenes in the relationship between perceived caregiver stress and caregiver's adaptive modes: physical function, self-esteem/mastery, and marital satisfaction.

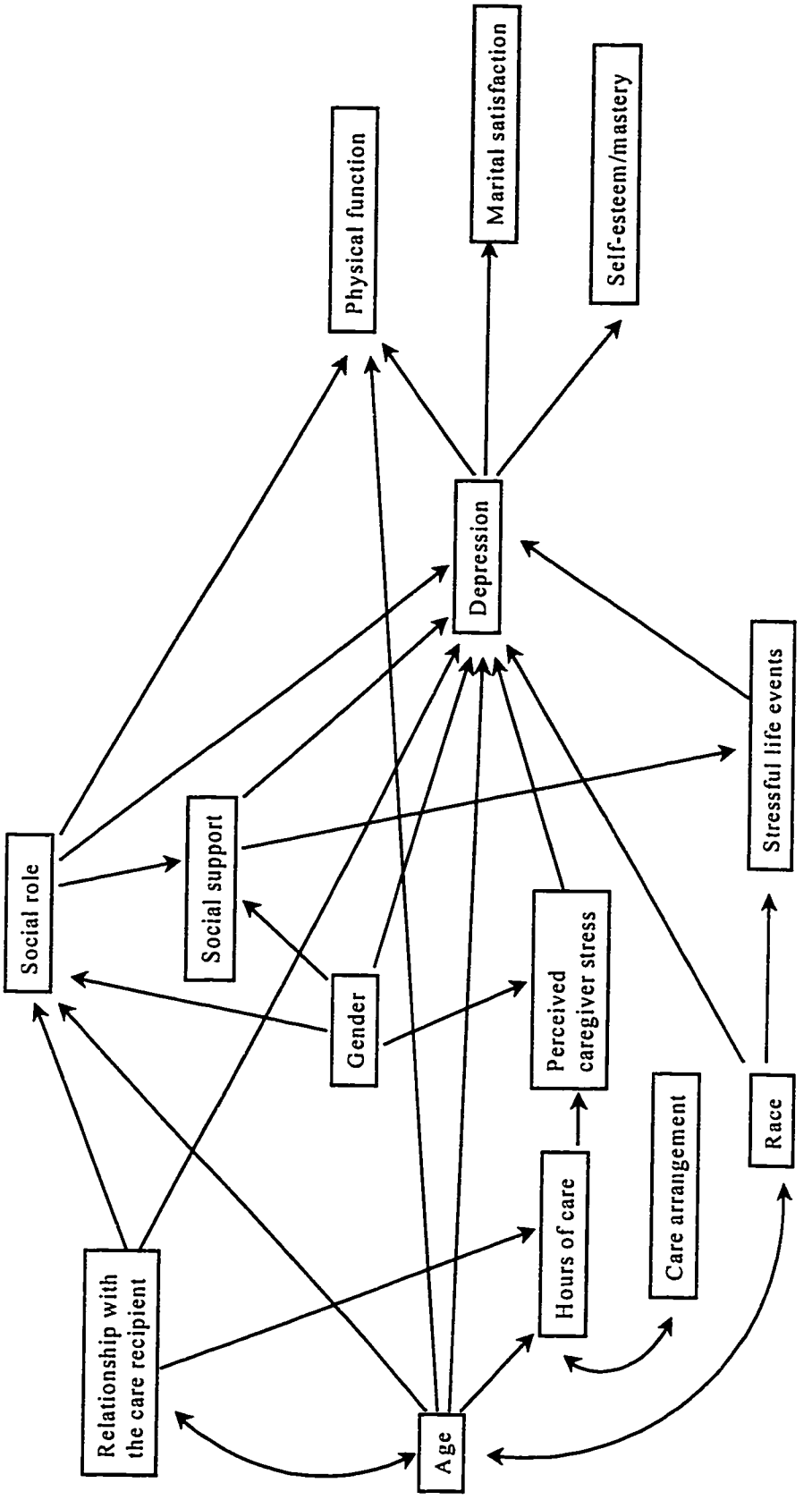


Figure 6.1. The final model predicting caregiver stress.

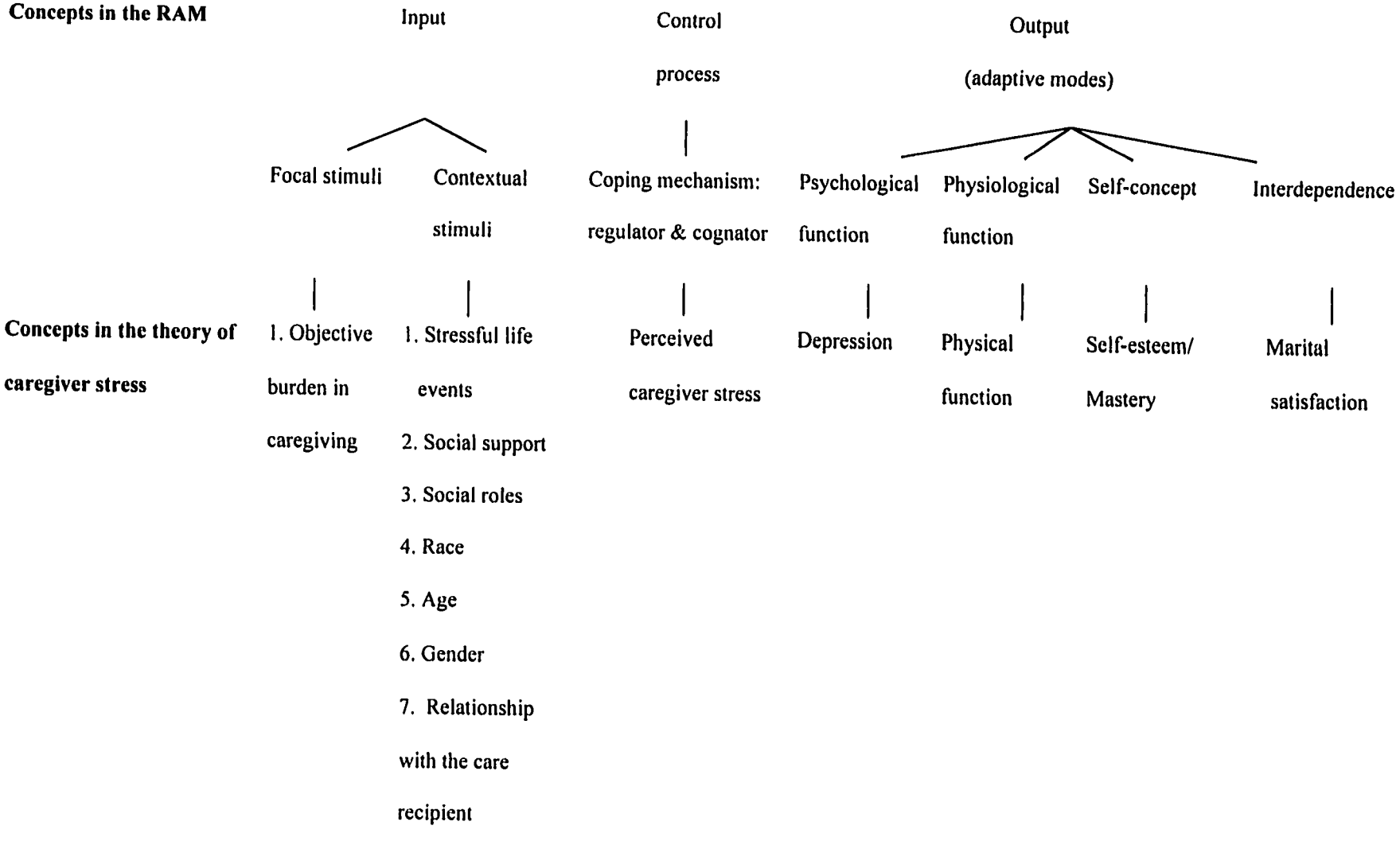


Figure 6.2 Revised conceptual-theoretical structure.

5. Stressful life events, social support and social roles neither influence perceived caregiver stress directly nor buffer the relationship between objective burden and perceived caregiver stress. Instead, they have significant influence on caregivers' physical function, self-esteem/mastery, marital satisfaction, and depression (psychological function) in the absence of perceived caregiver stress.

6. There are causal relationships among stressful life events, social support, and social role. For example, social role shapes the amount of social support received by caregivers. Social support influences the occurrence of stressful life events.

7. Race, age, gender, and relationship with the care recipient influence perceived caregiver stress directly or indirectly. In addition, they also have impacts on the other environment stimuli (stressful life events, social support and social role) and caregivers' response-depression (psychological function), and physical function, self-esteem/mastery, marital satisfaction through depression.

Important Findings of This Study and Discussion

The results from this study provide valuable insights to the RAM caregiving experience. The following discussions focus on the important findings of this study and discussion.

1. Objective burden in caregiving and perceived caregiver stress were not the most important determinants of their outcomes in the context of caregiving to the chronically ill

Objective burden in caregiving and perceived caregiver stress were considered to play important roles in the theory of caregiver stress. It was expected that objective

burden in caregiving would lead to perceived caregiver stress. Caregivers experiencing greater perceived caregiver stress would be more likely to have ineffective responses. However, the two factors performed poorly in predicting outcomes from these models.

In this study, one of the two objective burdens in caregiving was shown to predict perceived caregiver stress, but was neither the only nor the important determining factor. The relevant objective burden in caregiving was hours of care, which explained a small portion of the variance in perceived caregiver stress. On the contrary, care arrangement, the other objective burden, did not have any predicting value on perceived caregiver stress.

The total accounted variance by environmental stimuli in perceived caregiver stress was relatively small. Perceived caregiver stress only contributed to a small amount of accounted variance in adaptive modes. In contrast, contextual stimuli and residual stimuli played much more significant roles in predicting depression and adaptive modes, which bolsters the notion that factors other than patients' characteristics and situational characteristics contribute to the prediction of caregivers' outcomes. Obviously, there are important conditions other than situational characteristics and these have not been discovered yet. Other studies had also suggested that patients' characteristics and situational characteristics were not the only determinants of caregiver's outcomes. For example, Pruchno et al. (1990) found that caregiving had little impact on subsequent burden, depression, or physical health of the caregiver, and George and Gwyther (1986a) stated that caregiving outcomes depended more on caregiver characteristics than characteristics of a patient's illness.

Such findings suggest that situational factors, such as objective burden in

caregiving (focal stimulus) and perceived caregiver stress (coping mechanism), are not the important determinants of caregivers' outcomes in a chronic caregiving situation. In this specific group, other environmental stimuli are more important than situational factors in predicting caregivers' outcome. This study points to the importance of contextual stimuli and residual stimuli, in addition to the focal stimuli and perceived caregiver stress, in predicting adaptive modes in a chronically ill caregiving situation.

The findings also indicate that the hypothesis that the control process would be the determining factor in the adaptive modes of the caregiver is unsubstantiated. Subjective perception, such as perceived caregiver stress alone, could not adequately answer the question of why people react to environmental stimuli differently.

The present findings suggest the adaptation of caregivers in a chronically ill caregiving context. It has been hypothesized that caregivers with chronically ill relatives would eventually adapt to the demands of the situation and either stabilize or improve over time (Townsend, Noelker, Deimling & Bass, 1989). For example, the survival time of patients with Alzheimer's disease is eight years, and the corresponding caregiving has been postulated as a chronic stressor (Fiore, Becker & Coppel, 1983). Therefore, it is possible that the chronic nature of the illness enables caregivers to adapt to the persistent need and to reestablish a balanced life over the long period of providing care. In this light, the objective burden in caregiving will no longer play a significant role to influence the level of perceived caregiver stress. Alternatively, one can also argue that caregivers would probably confront many different problems other than objective burden before he/she adapts to a chronic caregiving situation. In either case, the impact of chronic caregiving may be diluted or diminished by the caregiver's competing daily stressors or

severe episodes of acute-type stressors. As a result, the causation between focal stimuli, objective burden in caregiving, and its outcome in a chronically ill caregiving situation may not be as clear as that in caregiving to the acutely ill relatives for a short period.

2. Perceived caregiver stress and depression were related yet distinct concepts in predicting caregivers' outcomes.

Caregiver stress can be reasonably expected to have a direct impact on depression. It is supported by the findings of the present research, and the claim made by Roy (1984) that depression is a reaction of a person to a real or perceived stress or threat. It is also compatible with the theory of stress process (Lazarus & Folkman, 1984), which postulates that situation-specific perceived stress may predict generalized psychological distress.

The findings in this research also contribute to the current debate concerning the conceptual difference between caregiver subjective burden and well-being (depression, for example). Montgomery et al. (1989) and Pruchno and Resch (1989) stated that subjective burden and general well-being were related, but distinct concept because they represent different points in the stress process. They argued that the caregiver's burden was embedded in the caregiving situation and contributed to the general well-being. Comparing to burden, well-being was a more global concept that could also be influenced by other factors. On the other hand, George and Gwyther (1986a) argued that caregiver burden and well-being were "opposite sides of the same coin", and therefore the concept of caregiver burden was redundant. The findings in the present research are more compatible with the views held by Montgomery et al. (1989) and Pruchno and Resch

(1989). Subjective burdens, such as perceived caregiver stress, and general well-being, such as depression, were two related, but distinct concepts. Perceived caregiver stress was one of the predictors for caregiver's general well-being (such as depression). However, perceived caregiver stress alone did not account for all the adverse outcomes. Other environmental stimuli, such as race, age, gender, relationship with the care recipient, stressful life event, social support, and social roles also contributed to the level of depression to different extents.

Perceived caregiver stress only had an indirect influence on some adaptive modes via depression. Other adaptive modes, such as role enjoyment and reciprocity, were not related to perceived caregiver stress at all. Such findings suggested that in predicting caregivers' adaptive modes, a global concept of well-being, such as depression, was favored over a situation-specific concept, such as perceived caregiver stress.

3. Depression was the most easily aroused outcome of perceived caregiver stress. However, it failed to demonstrate its mediator role between perceived caregiver stress and all adaptive modes, and to showed its association with all modes.

One question postulated in this study was whether depression was one part of the coping mechanism, an adaptive mode (psychological function), or if it was manifested in the four adaptive modes. The present findings showed that depression served as the mediator between perceived caregiver stress and some of the adaptive modes, but that it did not have any association with some of adaptive modes. Therefore, the result of this study did not support the notion that depression manifested itself in all four adaptive modes.

Roy (1984) stated that depression was a coping mechanism that allowed psychic relief by immobilizing and/or distracting the person from the stress and threat. Although depression mediated between perceived caregiver stress and some of the adaptive modes, it failed to predict other certain adaptive modes, such as role enjoyment and reciprocity. Hence, there was not enough evidence to conclude that depression was a coping mechanism that predicted adaptive modes.

The literature on caregivers suggested that depression was one of a caregiver's first, readily aroused (Pearlin, 1994) and enduring psychological outcomes of the stress process (Aneshensel, Pearlin, Mullan, Zarit & Whitlatch, 1995; George, 1980; House, 1974; Schulz, 1990). Roy (1984) suggested that depression could be an outcome of the adaptive process. The present findings were consistent with these views and indicated that it was likely that depression was one of the modes, namely the psychological function. Depression was the immediate outcome of perceived caregiver stress and led to change of some adaptive modes. In other words, this study confirmed that depression was the most readily aroused adaptive mode leading to the change in other adaptive modes.

This study showed the importance of psychological mediators in the care of a chronically ill relative. The question of how caregivers manage to avoid ineffective responses or why some caregivers are at risk to adverse outcomes can be partially answered by understanding the role of depression. By targeting the portion of the caregiver population that is experiencing depression, clinical intervention and management of high risk caregivers experiencing adverse outcomes in situations of caregiving to the chronically ill can be largely realized.

4. Contextual stimuli did not have either the main effect on perceived caregiver stress or a moderated effect on the relation between objective burden in caregiving and perceived caregiver stress. Instead, they significantly influenced caregivers' outcomes directly.

It has been hypothesized that stressful life events had additive effects on the coping mechanism, whereas social support and social roles moderated the relation between objective burden in caregiving and coping mechanism. However, the findings in this research suggested that contextual stimuli (stressful life events, social support, and social roles) neither moderate the relation between focal stimuli (objective burden in caregiving) and coping mechanism (perceived caregiver stress) nor contribute to the effect of focal stimuli (objective burden in caregiving) on coping mechanism (perceived caregiver stress).

Why did stressful life events fail to predict perceived caregiver stress? One explanation might be that stressful life events and perceived caregiver stress work independently in predicting caregivers' adaptive modes. Past research has shown that it was not necessary for stressful life events to influence health outcome through perceived stress. Rather, they were confounded in predicting health (Nielson, Brown & Marmot, 1989). Studies by Cohn, Tyrell, and Smith (1991) suggested that these two factors were mediated by different biological processes in predicting health outcomes. On the other hand, Stone and his colleagues (1992) reported that stressful life events directly led to adverse health outcomes instead of being mediated by perceived stress (Stone et al., 1992). These works challenged the notion in the RAM that perceived stress is mandatory for stressful life events to influence health outcomes.

Unexpectedly, social support was found to have no impact on perceived caregiver stress in this study, but this was not unprecedented; similar results had already been reported by Lawton and others (1991). This finding suggested that social support may be conceptualized in some other ways. The multifaceted nature of social support has been suggested by many other researchers (House, 1981; Thoits, 1982). It is possible that some aspects of social support may be more important than others in reducing perceived caregiver stress. Alternatively, social support directly influences the caregiver's well-being without being mediated by stress process, as suggested by the main effect model (House, 1981; Thoits, 1983a). In other words, social support promotes the well-being of caregivers regardless of the level of stress. Another reason that social support did not predict perceived caregiver stress in this study might be the influence of gender, a finding similar to that reported in an earlier study (Hill, 1991). Since female caregivers obtain social support more easily than males, the dependence of perceived caregiver stress on social support may be a pseudo-impact caused primarily by gender-related differences.

To my surprise, perceived caregiver stress was not related to the aggregated measure of caregivers' social roles. It is possible that perceived caregiver stress may be influenced more directly by certain specific social roles, such as worker, mother, and spouse (George & Gwyther, 1986; Stephens & Townsend, 1997). On that account, giving all social roles equal weight may diminish the significant effect of certain roles on perceived caregiver stress.

Instead of influencing adaptive modes and depression through perceived caregiver stress, contextual stimuli had an impact on caregivers' outcomes directly. Stressful life events were found to be positively related to depression in the present study; their

correlation has been demonstrated previously in many other studies. (Hammen, Mayol, deMayo & Marks, 1986; Mitchell, Cronkite & Moos, 1983; Paykel, 1974; Sarason, Hohnson & Siegel, 1978; Tousignant & Maldonado, 1989). Life events as factors in the etiology of depression have been reported by Brown and Harris (1978). Undesirable life events include health problem, death of a family member or close friend, and changes in social status, financial security, or social condition. People must choose whether to face the demands of these stressful life events or to escape from them, and, subsequently, have to make the corresponding psychological adjustments.

Social roles were found to have positive effect on caregivers' adaptive modes and depression. Multiple social roles have been shown to enhance the well-being in the elderly (Adelmann, 1994), women (Coleman, Antonucci, & Adelmann, 1987; Waldron & Jacobs, 1989), and caregivers (Stephens, Franks & Townsend, 1994). Sharing resources among different social roles was suggested to enable a person to better relieve the demands of these roles in the expansion hypothesis (Barnett & Baruch, 1987). Therefore, the more roles occupied, the greater the chances of being healthier, happier in their roles, more reciprocal in relationships, and less depressed.

Social support was found to influence depression and role enjoyment. Past research has shown that low social support would make people more vulnerable to depression. The pattern has been clearly demonstrated in patients with heart transplant (Dew et al., 1994), cancer (Grassi, Malacarne, Maestri, & Ramelli, 1997), and clinically diagnosed depression (Brugha, Bebbington, Stretch, MacCarthy, & Wykes, 1997). The trend was also true for the elderly (Prince, Harwood, Blizard, Thomas, & Mann, 1997; Robert, Kaplan, Shema, & Strawbridge, 1997); for socially disadvantaged racial groups

(Warren, 1997); and for caregivers (Baillie, Norbeck & Barnes, 1988; MaloneBeach, & Zarit, 1995). Relief from the demand of stressful situations can be realized by providing emotional comfort, giving material and cognitive assistance, and/or sharing tasks. Therefore, social support is beneficial in one's adjustment to a stressful situation since it lowers a person's psychological distress.

A possible explanation of why social support was found to predict role enjoyment is that people with more social support are more likely to obtain help in times of need. Therefore, adequate avenues of social support enable these caregivers to manage their different roles and relieve their role strain relatively easier. Thus, social support reduces a caregiver's role strain and helps he/she to respond promptly, which leads to more role enjoyment.

5. Among residual stimuli, gender was the only stimulus that was found to predict perceived caregiver stress. Residual stimuli in this study played more important roles in predicting focal stimuli, contextual stimuli, depression, and adaptive modes. Therefore, race, age, gender and relationship with the care recipient might be recategorized as contextual stimuli

Among the residual stimuli, gender was found to be the only predictor for perceived caregiver stress. This finding was consistent with the literature, which documented the greater susceptibility of women to experience stress (Barusch & Spaid, 1989; Miller & Cafasso, 1992; Pruchno & Resch, 1989). Also gender was found to be directly related to social support, social roles, and reciprocity. That female caregivers were more likely to obtain social support was supported by previous research (Biegel, Sales & Schulz, 1991), to possess fewer social roles (Coleman, Antonucci, Adelmann, &

Crohan, 1987; Verbrugge, 1987), and to be able to reciprocate easily (Lu, 1997). Traditionally women assume spouse and parent as their primary roles, and it is still the trend even now. Thus, when women encounter conflicts in career, marriage and family responsibilities, they tend to place the marriage and family responsibilities higher than career choices and switch to part-time positions or even quit work; thus leaves them with fewer social roles. In addition, because they belong to a stronger informal social network with more supportive behavior, women more easily address and gratify their own and other people's needs.

Although there is a general consensus that older caregivers are more susceptible to the stress of caregiving, exceptions exist in the caregiving literature. These incompatible results might have been caused by confounding factors that were not clearly defined in the study design. Gender, health status, relationship with the care recipient, and social roles have all been found to confound with age (Gallant, 1995). By controlling these confounding factors, the present study provided a clear assessment of the independent effect of age on caregiver stress and other variables.

Age was found to be connected to the relationship with the care recipient, which was shown to have an impact on perceived caregiver stress through hours of care, which had an impact on the number of social roles. It is likely that a spouse or older caregiver tends to assume the role of primary caregiver when attending their chronically ill relatives (Stone, Cafferata, & Sangl, 1987), which in turn results in fewer social roles and more hours in caregiving, which leads to more perceived caregiver stress.

In this study, aged caregivers exhibited lower levels of physical function which was strongly related to their relationship with the care recipient. On the other hand, the

relationship with the care recipient had no effect on caregivers' physical function. This study supported the importance of age in predicting physical function. As suggested by past research, age confounds with relationship with the care recipient in predicting caregivers' adverse health outcomes, especially physical function. For example, the study of George and Gwyther (1986a) found that spouse caregivers were more susceptible to adverse outcomes, such as diminished physical function. The adverse outcomes in spouse caregivers were reportedly caused by the older age of the caregivers, as noted by George and Gwyther (1986a).

Race was found to predict stressful life events and confound with age. This was consistent with previous findings in children and the general population. Minority children tended to experience more undesirable life events than White children (Gillum, Prineas, Gomez-Marin, Chang, & Finn, 1984). A greater susceptibility to stressful life events was also observed in minorities (Goldberg and Comstock, 1980). According to vulnerable hypotheses, the impact of the stressor depends on the vulnerability of the person (Dohrenwend & Dohrenwend, 1981). Conceivably, because minorities tend to have fewer societal advantages than Whites, this may lead to more episodes of stressful life events. Goldberg and Comstock (1980) found that these stressful life events were connected to each other with increasing susceptibility. Thus, minorities would experience more stressful life events than Whites in general.

Although past studies showed that non-White caregivers experience less burden and lower stress (Hinrichsen & Ramirez, 1992; Lawton, Rajagopal, Brody, & Kleban, 1992), it has not been found in this study. However, the findings showed that race was related to age. Perhaps the weak role of race in predicting burden may be partly explained

by the presence of age. As discussed previously, older caregivers tend to assume the role of primary caregiver, further leading to perceived caregiver stress via providing more hours of care.

All residual stimuli, including race, age, gender and relationship with the care recipient directly predicted depression. This has been reported repeatedly in past research although it was not addressed in the theory of caregiver stress. Depression has multiple causes, some hidden in the background characteristics of the individual caregiver. Depression was found to be more common among White, younger, female, and spouse caregivers (Cornoni-Huntly, Huntly & Feldman, 1990; Lawton, et al., 1992; Mui, 1995ab; Pruchno & Potashnik, 1989). The racial difference is possibly due to the fact that the ethnic background of a caregiver may contribute to the way he/she appraises and categorizes the demands made by caregiving, which results in the differing levels of depression between White and non-White. Young people usually have higher expectations and try to take everything into their own hands; this results in more role strain in life. Combined these things would aggravate and lead to depression as the caregiver gradually realizes the commitment of time and energy involved in chronic caregiving. Female and spouse caregivers tend to assume the primary caregiver role and, thus, are more committed to caregiving that requires more psychological adjustment. Therefore, they may be more readily disposed to depression than other caregivers.

As defined by Roy (Andrews & Roy, 1991a), residual stimuli are the stimuli whose effect on the adaptation process is not clear. However, the finding of this study show that race, age, gender and relationship with the care recipient did play important roles in predicting caregiver's outcomes. They acted more like contextual stimuli in the

model. That is, their effects were measurable and they contributed to the effect of the focal stimuli on the coping process.

6. There were no causal relationships among adaptive modes; instead, adaptive modes were either predicted by depression, contextual stimuli, or residual stimuli.

The present findings showed that adaptive modes were predicted either directly by environment stimuli or depression, but that no causal relationship was found among the adaptive modes. A large amount of variance in adaptive modes was attributed to depression and environmental stimuli. The current findings, then, add to the RAM, which does not support the possibility of causal relationship among modes.

Consistent with previous studies, depressive caregivers were found to experience low physical function, low self-esteem/mastery, and low marital satisfaction. The connection between physical function and depression has been studied extensively. Although depression has been recognized to predict low physical function in the normal population, the elderly, and caregivers (Andrews, Tennant, Hewson, & Schonell, 1978; Cadoret & Widmer, 1988; George & Gwyther, 1986a; Haley, Levine, Brown, Berry, & Hughes, 1987), no consensus regarding causation has been reached. The present results tend to support the notion that depression leads to a decline in physical function. This is supported by Pruchno and his colleagues (1990). A depressive person may be more sensitive to physical complaints than the nondepressive. Alternatively, depression may result in greater susceptibility to illness through disrupted health habits (Botwinick & Storandt, 1974).

Findings in this research also indicated that depression led to lower self-

esteem/mastery. A depressed person usually lacks inner strength and self-confidence, which makes him/her more susceptible to lower self-esteem/mastery. Although it is equally reasonable to assume that low self-esteem/mastery results in depression, or that they affect each other in the same level, the specification search did not support the latter assumption.

Depressed caregivers were more likely to experience lower marital satisfaction too. Past research has noted that depression leads to dysfunction in the marital relationship. Gotlib and Whiffen (1989) found that the couples in which one spouse was clinically depressed exhibited more marital problems than the community controls. Blumenthal and Dielman (1975) and Heins (1978) also noted that increased depressive symptoms in the general population were associated with a decline in marital satisfaction. The marital problems caused by depression were displayed through a variety of dysfunctional interaction patterns, such as reduced general affective involvement and affections expression, increased criticism, and an imbalanced relationship.

Role enjoyment and reciprocity were found not to be related to the rest of the adaptive modes in this research; they could not be predicted by either perceived caregiver stress or depression. Instead, role enjoyment was predicted by social role and social support, while reciprocity was predicted by social support and gender. Aggregate role enjoyment was not investigated in previous research. Instead, most of the past studies focused on the individual roles of spouse, parent, employee, and caregiver, with special linkages between a specific role and depression. For example, Martire, Stephens, and Atienza (1997) noted that satisfaction with caregiving and work were directly associated with less depression. It is likely that certain role enjoyments may be more important than

others with a stronger association to all stimuli, modes, and/or coping mechanisms. An arithmetic average of all role enjoyments may even out the importance of a single role enjoyment in this study.

In the context of long-term care, most studies on reciprocity focused on the exchanges between older care recipients and their primary caregivers. The results were equivocal with negative relationship (Stroll,1985), positive relationship (Wentkowski, 1981), and no relationship (Dwyer, Lee, and Jonkowski, 1994; McCulloch, 1990) between reciprocity and well-being. The present findings indicated that reciprocity was not related to a caregiver's well-being, which is consistent with the findings of McCulloch (1990) and Dwyer, Lee, and Jonkowski (1994). This is possibly due to different measures of reciprocity and well-being. Reciprocity in the present study was measured by the help provided by the caregiver to friends and relatives; in other studies it was measured by mutual exchanges between the care recipient and caregiver. An examination of dyad reciprocal help may provide a better conclusion about the relationships among reciprocity and its predictors and other modes.

Limitations

The present study stands out in that it is based on a sizable national sample with a specific focus on the differences between Black and White Americans, ages 25 years old and above. However, the measures used in this study were limited by the variables in the original study, a typical limitation for the analysis of secondary data. It further limits the possible choices in operationalizing constructs.

With respect to measurement, all latent variables except depression and physical

function were set to be a single indicator to increase the power of the analysis. Their corresponding measurement errors were set to zero. Although single indicator latent variables are not ideal, they do reduce the possibility of artificial relations among the tested variables and are considered to be conservative.

Limitations also existed in the sample and study design. The sample for this study included (a) caregivers who have a chronically ill parent, grandparent, aunt or uncle; and (b) spouse caregivers aged 55 and over. The age of care recipients, however, was not available in the data set. It is possible that some care recipients were younger than 65 years old. Further, the study was cross-sectional and, consequently, was limited in testing the causal relationships depicted in the theory. Although structural equation modeling allows researchers to test the causal relations among latent constructs with cross-sectional data, it is necessary to have the correct time ordering of variables to prove the causality. In other words, the alleged cause must precede the effect. However, the research findings provide preliminary support for the plausibility of causal relations among variables. Better examination of the causality will require longitudinal data.

In addition, the cross-sectional data only allow the researcher to examine one point of the ongoing adaptation process. In other words, over time, the adaptive or ineffective responses of a caregiver's adaptation process will influence his/her perception of stress in the future, which, in turn, will affect his/her subsequent adaptation. Therefore, the conceptualization of the adaptation process tested in the present study only depicts one point in time of an ongoing multistage process. It is possible that the direction of causation may differ among variables when the researcher examines a different time point in the adaptation process.

There are potential problems related to the data analysis. The fitting function of LISREL's maximum likelihood estimation assumes a multinomial normal distribution among observed variables. Some observed variables in this study were categorical and may not meet the multinormality assumption. The robustness of LISREL's maximum likelihood estimation remains to be explored. However, Johnson and Creech (1983) found that parameter estimates based on categorized variables are relatively close to estimates for continuous variables, although correlated errors of measurement occur more frequently in models with categorized observed variables.

In addition, model-data consistency does not imply model-reality consistency using structural modeling. Beside the true model there are many others that might fit the data; therefore, model-data consistency is not sufficient for model-reality consistency (Bullen. 1989). In the present study, the final data-derived model has been partially cross-validated by a separate data set to single out the most plausible model, as suggested by Bullen (1989). A model is mere approximation of reality, and it is impossible for it to contain all details and mechanisms. Hence, all causal inferences must be considered tentative, although subjectively we may have some degree of confidence in the causal relations among variables (Bullen, 1989).

Implications and Recommendations for Further Research and Interventions

The results of this research have several significant implications for future research in the Roy Adaptation Model. The present study also provides important insights in caregiving and enables better prediction of caregiver stress and its outcome. The improved prediction may help to make corresponding interventions in social service and

clinical care. In addition, this study also provides evidence to show the usefulness of structural equation model and secondary data analysis in theory testing and theory building in nursing.

Implication for Further Research in RAM and the Caregiving Process

The findings from this study have implications for further research into the RAM and the caregiving process. First, although focal stimuli in an acute situation may work in the ways suggested by the RAM, the theory derived from the RAM failed in the context of chronic caregiving because of adaptation. In a chronic situation, focal stimuli and corresponding coping mechanism might not reliably predict the caregiver's outcomes, as indicated by the initial theory of caregiver stress and the final model. Rather, contextual stimuli and residual stimuli played more important roles in predicting the caregiver's outcome in chronic situations. However, most studies related to the RAM focused on acute conditions and were not related to caregiving. Findings in this research suggest the importance of differentiating between chronic stressors and acute stressors in assessing caregiver situations, since their impact and mechanism may vary.

Second, the relationship among the variables in predicting caregiver's outcome are far more complex than the linear model proposed in the RAM. As indicated in the current study, even factors within stimuli and adaptive modes affected one another. Some stimuli have a direct effect on adaptive modes instead of being mediated by the control process. Altogether, they challenged the simple linear relationship among concepts in the RAM. The answer to this question would be enhanced by qualitative approaches as well as quantitative investigations. Since caregiving-related variables, such as objective

burden in caregiving and perceived caregiver stress, account for only a little variance, adding qualitative approaches is particularly useful to identify potential factors in predicting caregiver stress in a chronic illness caregiving situation.

Third, to reduce the numbers of parameters, the present study used valid single indicators to improve its power in testing the theory. However, the valuable roles held by contextual stimuli that merged in the present study lends support for a more detailed examination of social support, stressful life events, and social roles in caregiving. Multiple indicators will present a more comprehensive look of their constructs. In addition, they should be measured with other relevant variables. For example, social support may emphasize both its functional and structural nature. A caregiver's stressful life events can be measured in terms of number of events as well as by the impact of the events. The number of roles, the impact of the core role, role expectation, and role conflict can be used to represent different dimensions of social roles.

Fourth, although the developed final data-derived model has been validated by a different sample to exclude the chance of a plausible model, there are some concerns in the developed model (see limitation). For example, the causality among variables in the model may need further investigation. Therefore, future research may be directed toward a longitudinal study to thoroughly test the causal relationships among the concepts raised in the present study. As discussed in the limitation section, the longitudinal study could make up the potential pitfalls of detecting causal relations in the cross-sectional study. In addition, a more robust indication of stimuli, perceived caregiver stress, and their outcomes could be obtained when data is collected at several points in time. Therefore, the hypothesized link among latent constructs could be directly estimated. In addition, it

is possible that there are cohort differences in the caregiving experience. Caregivers' experiences in the 1980s may be different from those in 1990s in terms of the meanings attached to the caregiving role. Thus, the model developed in this study may need to be modified according to the current knowledge of caregiving experience. A more recent data set should be used to validate the current developed model.

Implication for Further Research in Nursing Using Structure Equation Model

Although structural equation modeling has been used intensively in social sciences for years, it was introduced to nursing science only recently. This present research demonstrates the usefulness of structural equation modeling in nursing research. First, this study allows some measurement error to be freely estimated by the LISREL programs. Ideally, the observed variables should perfectly reflect the concepts which the researchers intent to measure. However, nearly all measures of abstract concepts in social sciences, include nursing, have far from perfect associations with the concepts. The presence of measurement errors leads the researcher to overestimate the causal impact of an independent variable on a dependent variable (Marsden, 1981). It is one of the most difficult obstacles to credible inference in causal analysis. Thus, structural equation models incorporating errors in variables are increasingly viewed as a valuable tool in making inference of this type. In other words, structural equation modeling is more realistic in their allowance for measurement errors in the observed variables (Bollen, 1989).

Second, this study also demonstrates the ability of structural equation modeling to decompose covariance between any two variables which in turn enhances the

interpretation of relationships as well as the pattern of the effects. The more elaborate the model, the better able the researcher to decompose the covariance into unambiguous components. In other words, structure equation modeling can be used to identify indirect effects, instead of the merely direct effect, of an independent variable on dependent variable. It enables the identification of possible intervening variables in the causal model. This feature is of particular important in nursing science. Nursing research always involves people, their interactions with the environment and the impact of such interactions on various aspects of physical, psychological and social well-being. To the extent that such complicated caused, and sometimes non-recursive relationships are the focus of nursing studies, structural equation modeling will prove to be a valuable research tool.

Third, this present research also shows that structural equation modeling is a powerful tool in theory testing and theory building in nursing. Ideally, structural equation modeling is more applicable when the study has a solid theoretical framework. Their greatest utility is to investigate causal models for latent variables assuming to be measured by a set of observed indicators based on a well-supported theory. However, this study also demonstrates a more exploratory way to build a model from the empirical data. Nursing, in general, and gerontological nursing, in specific, strive to build a body of knowledge. Many nursing theories have been tested and revised in various stages. In a well-established area of knowledge, structural equation modeling provides empirical evidence to support the existing theories. On the other hand, a data derived model will enhance our understanding of a primitive area of knowledge, such as gerontological nursing. Both strategies are useful in examining and in exploring the causal relationships

among concepts in explaining and predicting nursing phenomena. Therefore, structural equation modeling should be employed not only in the theory testing stage but also in the theory building stage depending on the contemporary knowledge of the area.

Implication for Further Research in Nursing Using Secondary Data Analysis

Although findings of this study suggested that using secondary data analysis in a theory testing stages encounters several difficulties, there are several advantages in using this strategy, such as cost-effective and time saving by allowing the use of observations and variables that cover a wide rang of social conditions and measurement procedure. More important, secondary analysis may push the researcher to elevate and enlarge the theorized process (Hyman, 1972). While researchers using primary data tend to focus on specific yet narrowly defined concepts, secondary analysts intend to use their own accustomed definitions. This process broadens the theoretical scope of the research and the choice of research problems. In addition, several projects related to chronic caregiving were and will be conducted in the Detroit metropolitan area. Caregivers may not be willing to participate in a similar research project because of the burdensome process. Such problems of participant recruitment and declination can be avoided in a secondary data analysis.

Appendix: Summary of Specification Search for the Final Data-Derived Model

Table 1

Summary of Specification Search for the Final Data-Derived Model

Mode steps	x^2 (df)	p	GFI	AGFI	RNFI	Comparison to Measurement Model: Δx^2 (Δ df)	p	Comparison to Previous Model: Δx^2 (Δ df)	p
1. Basic measurement model: All latent construct interrelated	151.82 (64)	.00	.95	.83	1.00				
2. Preliminary model: Hypothesized structural model	870.89 (160)	.00	.75	.67	0.38	719.07 (96)	<.01		
3. Drop path from perceived caregiver stress to role enjoyment	872.26 (161)	.00	.75	.67	0.38	720.44 (97)	<.01	1.37 (1)	n.s.
4. Drop path from perceived caregiver stress to marital satisfaction	873.39 (162)	.00	.75	.67	0.38	721.57 (98)	<.01	1.13 (1)	n.s.
5. Drop path from perceived caregiver stress to reciprocity	876.33 (163)	.00	.75	.67	0.38	724.51 (99)	<.01	2.94 (1)	n.s.
6. Drop path from care arrangement to perceived caregiver stress	876.82 (164)	.00	.75	.67	0.38	725.00 (100)	<.01	0.49 (1)	n.s.
7. Drop path from hours of care to perceived caregiver stress	879.98 (165)	.00	.74	.68	0.37	728.16 (101)	<.01	3.16 (1)	n.s.
8. Drop path from stressful life events to perceived caregiver stress	880.01 (166)	.00	.74	.68	0.37	728.19 (102)	<.01	0.03 (1)	n.s.
9. Drop path from social support to perceived caregiver stress	880.76 (167)	.00	.74	.68	0.37	728.94 (103)	<.01	0.75 (1)	n.s.
10. Drop path from social roles to perceived caregiver stress	881.37 (168)	.00	.74	.68	0.37	729.55 (104)	<.01	0.61 (1)	n.s.
11. Drop path from race to perceived caregiver stress	883.75 (169)	.00	.74	.68	0.37	731.93 (105)	<.01	2.38 (1)	n.s.
12. Drop path from age to perceived caregiver stress	885.92 (170)	.00	.74	.68	0.37	734.10 (106)	<.01	2.17 (1)	n.s.
13. Drop path between physical function and role enjoyment	888.88 (171)	.00	.74	.68	0.37	737.06 (107)	<.01	2.96 (1)	n.s.
14. Drop path between physical function and marital satisfaction	892.81 (172)	.00	.74	.68	0.36	740.99 (108)	<.01	3.93 (1)	<.05
15. Drop path between self-esteem/mastery and role enjoyment	892.83 (173)	.00	.74	.68	0.36	741.01 (109)	<.01	0.02 (1)	n.s.
16. Drop path between self-esteem/mastery and marital satisfaction	893.57 (174)	.00	.74	.68	0.36	741.75 (110)	<.01	0.74 (1)	n.s.
17. Drop path between role enjoyment and marital satisfaction	895.17 (175)	.00	.74	.69	0.36	743.35 (111)	<.01	1.60 (1)	n.s.
18. Drop path between role enjoyment and reciprocity	896.67 (176)	.00	.74	.69	0.36	744.85 (112)	<.01	1.50 (1)	n.s.
19. Drop path between marital satisfaction and reciprocity	897.55 (177)	.00	.74	.69	0.36	745.73 (113)	<.01	0.88 (1)	n.s.

Table 1 continued

Mode steps	x^2 (df)	p	GFI	AGFI	RNFI	Comparison to Measurement Model: Δx^2 (Δ df)	p	Comparison to Previous Model: Δx^2 (Δ df)	p
20. Add path from age to social roles	781.29 (176)	.00	.77	.73	0.48	629.47 (112)	<.01	-116.26 (-1)	<.01
21. Add path from self-esteem/mastery to depression	689.51 (175)	.00	.79	.75	0.57	537.69 (111)	<.01	-91.78 (-1)	<.01
22. Add path between age and relationship with the care recipient	632.05 (174)	.00	.81	.77	0.63	480.23 (110)	<.01	-57.46 (-1)	<.01
23. Add path from social roles to reciprocity	587.09 (173)	.00	.82	.78	0.67	435.27 (109)	<.01	-44.96 (-1)	<.01
24. Drop path between physical function and reciprocity	588.13 (174)	.00	.82	.78	0.67	436.31 (110)	<.01	1.04 (1)	n.s.
25. Add path from depression to physical function	549.25 (173)	.00	.83	.79	0.71	397.43 (109)	<.01	-38.88 (-1)	<.01
26. Drop path from perceived caregiver stress to physical function	550.98 (174)	.00	.83	.79	0.71	399.16 (110)	<.01	1.73 (1)	n.s.
27. Drop path between physical function and self-esteem/mastery	551.05 (175)	.00	.83	.80	0.71	399.23 (111)	<.01	0.07 (1)	n.s.
28. Add path between care arrangement and hours of care	514.61 (174)	.00	.84	.80	0.74	362.79 (110)	<.01	-36.44 (-1)	<.01
29. Add path from social roles to physical function	479.72 (173)	.00	.85	.81	0.78	327.90 (109)	<.01	-34.89 (-1)	<.01
30. Add path from age to hours of care	450.26 (172)	.00	.86	.82	0.81	298.44 (108)	<.01	-29.46 (-1)	<.01
31. Add path from gender to social support	432.58 (171)	.00	.86	.83	0.83	280.76 (107)	<.01	-17.68 (-1)	<.01
32. Add path from depression to marital satisfaction	415.09 (170)	.00	.87	.83	0.84	263.27 (106)	<.01	-17.49 (-1)	<.01
33. Add path from social roles to role enjoyment	401.02 (169)	.00	.87	.84	0.86	249.20 (105)	<.01	-14.07 (-1)	<.01
34. Add path from relationship with the care recipient to depression	386.37 (168)	.00	.87	.84	0.87	234.55 (104)	<.01	-14.65 (-1)	<.01
35. Add path from race to depression	371.48 (167)	.00	.88	.85	0.88	219.66 (103)	<.01	-14.89 (-1)	<.01
36. Drop path between self-esteem/mastery and marital satisfaction	372.70 (168)	.00	.88	.85	0.88	220.88 (104)	<.01	1.22 (1)	n.s.
37. Add path from race to stressful life events	362.17 (167)	.00	.88	.85	0.89	210.35 (103)	<.01	-10.53 (-1)	<.01
38. Add path from relationship with the care recipient to social roles	352.64 (166)	.00	.88	.85	0.90	200.82 (102)	<.01	-9.53 (-1)	<.01
39. Add path from age to physical function	344.07 (165)	.00	.89	.85	0.91	192.25 (101)	<.01	-8.57 (-1)	<.01

Table 1 continued

Mode steps	x^2 (df)	p	GFI	AGFI	RNFI	Comparison to Measurement Model: Δx^2 (Δ df)	p	Comparison to Previous Model: Δx^2 (Δ df)	p
40. Add path from relationship with the care recipient to hours of care	335.78 (164)	.00	.89	.86	0.92	183.96 (100)	<.01	-8.29 (-1)	<.01
41. Add path between age and race	328.39 (163)	.00	.89	.86	0.92	176.57 (99)	<.01	-7.39 (-1)	<.01
42. Add path from social support to role enjoyment	321.31 (162)	.00	.89	.86	0.93	169.49 (98)	<.01	-7.08 (-1)	<.01
43. Add path from social support to stressful life events	314.97 (161)	.00	.90	.87	0.93	163.15 (97)	<.01	-6.34 (-1)	<.05
44. Add path from gender to reciprocity	308.82 (160)	.00	.90	.87	0.94	157.00 (96)	<.01	-6.15 (-1)	<.05
45. Add path from race to self-esteem/mastery	302.72 (159)	.00	.90	.87	0.94	150.90 (95)	<.01	-6.10 (-1)	<.05
46. Add path from social roles to social support	296.74 (158)	.00	.90	.87	0.95	144.92 (94)	<.01	-5.98 (-1)	<.05
47. Add path from stressful life events to depression	291.40 (157)	.00	.90	.87	0.95	139.58 (93)	<.01	-5.34 (-1)	<.05
48. Add path from age to depression	285.46 (156)	.00	.91	.87	0.96	133.64 (92)	<.01	-5.94 (-1)	<.05
49. Add path from social roles to depression	279.46 (155)	.00	.91	.87	0.96	127.64 (91)	<.01	-6.00 (-1)	<.05
50. Add path from perceived caregiver stress to depression	271.11 (154)	.00	.91	.88	0.97	119.29 (90)	<.05	-8.35 (-1)	<.01
51. Add path from depression to self-esteem/mastery	261.24 (153)	.00	.91	.88	0.98	109.42 (89)	n.s.	-9.87 (-1)	<.01
52. Drop path from perceived caregiver stress to self-esteem/mastery	262.09 (154)	.00	.91	.88	0.98	110.27 (90)	n.s.	0.85 (1)	n.s.
53. Drop path from self-esteem/mastery to depression	263.01 (155)	.00	.91	.88	0.98	111.19 (91)	n.s.	0.92 (1)	n.s.
54. Drop path from race to self-esteem/mastery	263.89 (156)	.00	.91	.88	0.98	112.07 (92)	n.s.	0.88 (1)	n.s.
55. Add path from social support to depression	258.22 (155)	.00	.91	.88	0.98	106.40 (91)	n.s.	-5.67 (-1)	<.05
56. Add path from gender to depression	253.59 (154)	.00	.91	.88	0.99	101.77 (90)	n.s.	-4.63 (-1)	<.05
57. Add path from gender to social roles	249.39 (153)	.00	.91	.88	0.99	97.57 (89)	n.s.	-4.20 (-1)	<.05
58. Add path from hours of care to perceived caregiver stress	245.37 (152)	.00	.92	.89	0.99	93.55 (88)	n.s.	-4.02 (-1)	<.05

Table 1 continued

Mode steps	x^2 (df)	p	GFI	AGFI	RNFI	Comparison to Measurement Model: Δx^2 (Δ df)	p	Comparison to Previous Model: Δx^2 (Δ df)	p
59. Drop path from relationship with the care recipient to perceived caregiver stress	247.11 (153)	.00	.92	.89	0.99	95.29 (89)	n.s.	1.74 (1)	n.s.

REFERENCE

Acton, G. J., Irvin, B. L., & Hopkins, B. A. (1991). Theory-testing research: Building the science. Advance Nursing Science, 14 (1), 52-61.

Adelmann, P. K (1994). Multiple roles and psychological well-being in a national sample of older adults. Journal of Gerontology, 49(6), S277-85.

Aldwin, C. M. (1991). Does age affect the stress and coping process? Implications of age differences in perceived control. Journal of Gerontology, 46(4), p174-180.

Allen, S. M. (1994). Gender differences in spousal caregiving and unmet need for care. Journal of Gerontology, 49(4), S187-S195.

Anderson, J., & Gerbing, D. W. (1984). The effects of sampling error on covergence, improper solutions and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. Psychometrika, 49, 155-173.

Andrews, G., Tennant, C., Hewson, D. M., & Vaillant, G. E. (1978). Life event stress, social support, coping style, and risk of psychological impairment. Journal of Nervous and Mental Disease, 166(5), 307-16.

Andrews, G., Tennant, C., Hewson, D., Schonell, M. (1978). The relation of social factors to physical and psychiatric illness. American Journal of Epidemiology, 108, 27-35.

Andrews, H. A. (1991a). Overview of the self-concept mode. In C. Roy & H. A. Andrews (Eds), The Roy Adaptation Model. The definitive statement.(pp. 269-280). Norwalk, CT: Appleton & Lange.

Andrews, H. A. (1991b). Overview of the role function mode. In C. Roy & H. A. Andrews (Eds), The Roy Adaptation Model. The definitive statement (pp. 347-362). Norwalk, CT: Appleton & Lange.

Andrews, H. A., & Roy, C. (1991a). Essentials of the Roy Adaptation Model. In C. Roy & H. A. Andrews (Eds), The Roy Adaptation Model. The definitive statement (pp. 3-26). Norwalk, CT: Appleton & Lange.

Andrews, H. A., & Roy, C. (1991b). Overview of the physiological mode. In C. Roy & H. A. Andrews (Eds), The Roy Adaptation Model. The definitive statement (pp. 57-66). Norwalk, CT: Appleton & Lange.

Andrews, H. A., & Roy, C. (1991c). The nursing process according to the Roy Adaptation Model. In C. Roy & H. A. Andrews (Eds), The Roy Adaptation Model. The definitive statement.(pp. 27-54). Norwalk, CT: Appleton & Lange.

Aneshensei, C. S., Pearlin, L. I. Mullan, J. T. Zarit, S. H., and Whitlatch, C. J. (1995). Profiles in Caregiving: The Unexpected Career. San Diego, CA: Academic Press.

Antonucci, T. C. (1985). Personal characteristics, social support, and social behavior. In R. H. Binstock and E. Shanas (Eds.), Handbook of Aging and the Social Science (2nd ed.), New York: Van Nostrand Reinhold.

Antonucci, T. C. (1985). Social support: Theoretical advances, recent findings and pressing issues. In I. G. Sarason & B. R. Sarason (Eds.), Social Support: Theory, Research, Application (pp.21-37). Dordrecht, The Netherlands: Martinus Nijhoff.

Antonucci, T. C., & Depner, C. F. (1982). Social support and informal helping relationships. In T. A. Wells (Eds.), Basic Processes in helping relationships (pp. 233-254). New York: Academic Press.

Artinian, N. T. (1988). The Stress Process Within the Roy Adaptation Framework: Sources, Mediators and Manifestations of Stress During Hospitalization and Six Weeks Post Discharge. Doctoral Dissertation, Wayne State University.

Baillie, V., Norbeck J. S., & Barnes, L. E. (1988). Stress, social support, and psychological distress of family caregivers of elderly. Nursing research, 37(4), 217-22.

Baker, A. C. (1993), The spouse's positive effect on the stroke patient's recovery. Rehabilitation Nursing, 18(1), 30-33.

Barnet, B., Joffe, A., Duggan, A. K., Wilson, M. D., & Repke, J. T. (1996). Depression symptoms, stress, and social support in pregnant and postpartum adolescents. Archives of Pediatrics and Adolescent Medicine, 150(1), 64-9.

Barnett, R. C., & Baruch, G. K. (1985). Women's involvement in multiple roles and psychological distress. . Journal of Personality and Social Psychology, 49, 135-145.

Barrera, M., & Ainlay, S. L. (1983). The structure of social support: A conceptual and empirical analysis. Journal of Community Psychology, 11, 133-143.

Barusch, A. S., & Spaid, W. M. (1989). Gender differences in caregiving: Why do wives report greater burden? The Gerontologist, 29(5), 667-676.

Bertalanffy, L. (1968). General System Theory. New York: George Brailler.

Biegel, D.E., Sales, E., & Schulz, R. (1991). Family Caregiving in Chronic Illness. Newbury Park, CA: Sage.

Blumenthal, M. D., & Dielman, T. E. (1975). Depressive symptomatology and

role function in a general population. Archives of General psychiatry, 32(8), 985-91.

Bollen, K. A. (1989). Structural Equations with Latent Variables. New York: A Wiley-Interscience Publication.

Boomsma, A. (1983). On the Robustness of LISREL (Maximum Likelihood Estimation) Against Small Sample Size and Nonnormality. Amsterdam: Sociometric Research Foundation.

Botwinick, J., & Storandt, M. (1974). Cardiovascular states, depressive affect, and other factors in reaction time. Journal of Gerontology, 29, 543-548.

Braithwaite, V. (1996). Understanding stress in informal caregiving: is burden a problem of the individual or of society? Research on Aging, 18, 139-174.

Brickman, P., Rabinowitz, V. C., Karuza, J., Coates, D., Cohn, E., & Kidder, L. (1982). Models of helping and coping. American Psychologist, 37, 368-384.

Brody, E. M. (1981). Women in the middle and family help to older people. The Gerontologist, 21, 471-480.

Brown, G. W., & Harris, T. O. (1978) Social Origins of Depression: A Study of Psychiatric Disorder in Women. London: Tavistock, 1978.

Brown, M. I (1964). Research in the development of nursing theory: The important of a theoretical framework in nursing research. Nursing research, 13(2), 109-112.

Brugha, T. S., Bebbington, P. E., Stretch, D. D., MacCarthy B., & Wykes, T. (1997). Predicting the short-term outcome of first episodes and recurrences of clinical depression: A prospective study of life events, difficulties, and social support networks. Journal of Clinical Psychiatry, 58(7), 298-306.

Buck, M.H. (1991) The personal self. In C. Roy & H. A. Andrews (Eds), The Roy Adaptation Model. The definitive statement (pp. 311-336). Norwalk, CT: Appleton & Lange.

Byrne, D. G. (1984). Personal assessments of life-event stress and the near future onset of psychological symptoms. British Journal of Medical Psychology, 57, 241-8.

Cadoret, R., & Widmer, R. (1988). The development of depressive symptoms in elderly following onset of severe physical illness. Journal of family Practice, 27, 71-76.

Calvert, M. M. (1989). Human-pet interaction and loneliness: A test of concepts from Roy's adaptation model. Nursing Science Quarterly, 2, 194-202.

Calvillo, E. R., & Flaskerud, J. H. (1993). The adequacy and scope of Roy's adaptation model to guide cross-cultural pain research. Nursing Science Quarterly, 6(3), 118-129.

Caplan, R. D., Robinson, C. A. R., French, J. R. P., Jr., Caldwell, J. R., & Shinn, M. (1976). Adhering to medical regiments: Pilot experiments in patient education and social support. University of Michigan, Ann Arbor.

Carson, M. A. (1991). The Effect of Discrete Muscle Activity on Stress Response. Doctoral Dissertation, Boston College School of Nursing, University Microfilm, Inc.

Chatters, L. M. & Taylor, R. J. (1990). Social integration. In Z. Harel, E. A. McKinney, & M. Williams (Eds.), Black Aged: Understanding Diversity and Service Needs (pp. 82-99). Newbury Park, CA: Sage.

Chenoweth, B., & Spencer, B. (1986). Dementia: the experience of family caregivers. The Gerontologist, 26(3), 267-272.

Christian, A. (1992). The relationship between women's symptoms of endometriosis and self-esteem. JOGNN, 22(4), 370-376.

Clair, J. M., Fitzpatrick, K. M., & La Gory, M. E. (1995). The impact of psychosocial resources on caregiver burden and depression: sociological variations on a gerontological theme. Sociological Perspectives, 38, 195-215.

Cobb, S. (1976). Social support as a moderator of life stress. Psychosomatic Medicine, 38, 300-314.

Cohen, D., & Eisdorfer, C. (1988). Depression in family members caring for a relative with Alzheimer's disease. Journal of the American Geriatrics Society, 36, 885-889.

Cohen, S., & Wills, T. A. (1985). Stress, social support and the buffering hypothesis. Psychological Bulletin, 8(2), 310-357.

Cohn,S., Tyrell, D. A. J., & Smith, A. P. (1991). Psychological stress and susceptibility to the common cold. New England Journal of Medicine, 325, 606-612.

Coleman, L. M., Antonucci, T. C., & Adelmann, P. K. (1987). Role involvement, gender, and well-being. In F. J. Crosby (Ed.), Spouse, Parent, Worker: On Gender and Mulltiple Roles. New Haven, CT: Yale university Press.

Coleman, L. M., Antonucci, T. C., Adelmann, P. K., & Crohan, S. E. (1987). Social roles in the lives of middle-ages and older black women. Journal of Marriage and

the Family, 49, 761-71.

Cornoni-Huntley, J. C., Huntley, R. R., & Feldman, J. J. (1990). (Eds.), Health Status and Well-being of the Elderly: National Health and Nutrition Examination Survey-1 Epidemiologically Follow-up Study. New York, NY: Oxford University Press.

Coser, L. (1974). Greedy Institution. New York: Free Press.

Cossette S. & Levesque, L. (1993). Caregiving tasks as predictors of mental health of wife caregivers of men with chronic obstructive pulmonary disease. Research in Nursing and Health, 16, 251-263.

Costa, P. T., Jr., & McCrae, R. R. (1980). Still stable after all these years: Personality as a key to some issues in adulthood and old age. In P. B. Baltes & O. G. Brim, Jr. (Eds.), Life-span development and behavior (Vol. 3, pp. 65-102). New York: Academic Press.

Crandall, C. S., Preisler, J. J. & Aussprung, J. (1992). Measuring life event stress in the lives of college students: the Undergraduate Stress Questionnaire (USQ). Journal of Behavioral Medicine, 15(6), 627-62.

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, 297-334.

Crosby, F (1984). Satisfaction and domestic life. In M. D. Lee & R. N. Kanungo (Eds.), Management of Work and Personal Life. New York: Praeger.

Cutrona, C. E. (1990). Stress and social support: In search of optimal matching. Journal of Social and Clinical Psychology, 9(1), 3-14.

Dew, M. A., Simmons, R. G., Roth, L. H., Schulberg, H. C., Thompson, M. E., Armitage, J. M., Griffith, B. P. (1994). Psychosocial predictors of vulnerability to distress in the year following heart transplantation. Psychological Medicine, 24 (4), 929-45.

Dobratz, M. C. (1993). Causal influences of psychological adaptation in dying. Western Journal of Nursing Research, 15(6), 708-729.

Dohrenwend, B. S. & Dohrenwend, B. P. (1981). Life stress and illness: formulation of the issues. In B. S. Dohrenwend & B. P. Dohrenwend (Eds.), Stressful Life Events and Their Contexts. New York: Watson

Dura, J. R., Haywood-Niler, E., & Kiecolt-Glaser, J. K. (1990). Spousal caregivers of persons with Alzheimer's and Parkinson's disease dementia: a preliminary comparison. The Gerontolgist, 30(3), 332-336.

Dwyer, J. W., Lee, G. R., & Jankowski, T. B. (1994). Reciprocity, elderly satisfaction, and caregiver stress and burden: The exchange of aid in the family caregiving relationship. Journal of Marriage and the Family, 56, 35-43.

Elliott, G. R., & Eisdorfer, C. (Eds.). (1982). Stress and Human Health: Analysis and Implication of research. New York: Springer.

Ellison, K. J. (1993). Focal and Contextual Stimuli Influencing Caregiving in Spouse of Older Adults with Diabetes. Doctoral Dissertation. University of Alabama at Birmingham.

Fawcett, J. (1995). Analysis and Evaluation of Conceptual Models of Nursing. Philadelphia: F.A. Davis Company.

Fawcett, J., & Down, F. S. (1992). The Relationship of Theory and Research. Philadelphia: F.A. Davis Company.

Fawcett, J., & Weiss, M. E. (1993b). Cross-cultural adaptation to cesarean birth. Western Journal of Nursing Research, 15(3), 282-297.

Finley, N. J. (1989). Theories of family labor as applied to gender differences in caregiving for elderly parents. Journal of Marriage and the Family, 51, 79-86.

Fiore, J., Becker, J., & Coppel, D. B. (1983). Social network interactions: A buffer or a stress? American Journal of Community Psychology, 11, 423-439.

Fitting, M., Rabins, P., Lucas, M. J. & Eastham, J. (1986). Caregivers for dementia patients: a comparison of husbands and wives. The Gerontologist, 26(3), 248-252.

Folkman, S., & Lazarus, R. (1980). An analysis of coping in a middle-aged community sample. Journal of Health and Social Behavior, 21, 219-239.

Forsyth, D. R. (1987). Social Psychology. Belmont, CA: Brooks/Cole.

Foster, G. (1963). The dyadic contract in Tzintzunzan II: Patro-client relationships. American Anthropologist, 65, 1280-1294.

Frederickson, K., Jackson, B. S., Strauman, T., & Strauman, J. (1991). Testing hypotheses derived from the Roy Adaptation Model. Nursing Science Quarterly, 4(4), 168-174.

Fry, P. S. (1984). The development of a geriatric scale of hopelessness: Implications for counseling and intervention with the depressed elderly. Journal of Counseling Psychology, 31, 322-331.

Gallant, M. P. (1995). The Stress Process Among Dementia Spouse Caregivers: The Effects of Burden, Appraised Control, Support, And Depression on Caregiver Health Behaviors. Doctoral Dissertation. The University of Michigan.

George, L. (1980). Role Transitions in Later Life. Monterey, CA: Brooks/Cole.

George, L. K., & Gwyther, L. P. (1986a). Caregiver well-being: a multi-dimensional examination of family caregivers of demented adults. The Gerontologist, 26(3), 253-259.

George, L. K., & Gwyther, L. P. (1986b). Caregivers for dementia patient: Complex determinants of well-being and burden. The Gerontologist, 26(3), 245-247.

Gillum, R. F., Prineas, R. J., Gomez-Marin, O., Chang, P. N., Finn, S. (1984) Recent life events in school children: Race, socioeconomic status, and cardiovascular risk factors. The Minneapolis Children's Blood Pressure Study. Journal of Chronic Disease, 37(11), 839-51, 1984.

Goldberg, E. L., & Comstock, G. W. (1980). Epidemiology of life events: Frequency in general populations. American Journal of Epidemiology, 111(6), 736-52.

Goode, W. (1960). A theory of strain. American Sociological Review, 25, 483-496.

Gotlib, I. H., & Whiffen, V. E. (1989). Depression and marital functioning: An examination of specificity and gender differences. Journal of Abnormal Psychology, 98(1), 23-30.

Grassi, L., Malacarne, P., Maestri, A., & Ramelli, E. (1997). Depression, psychosocial variables and occurrence of life events among patients with cancer. Journal of Affective Disorders, 44(1), 21-30.

Haan, N., Millsap, R., & Hartka, E. (1986). As time goes by: Change and stability in personality over fifty years. Psychology & Aging, 1, 220-232.

Haley, W. E., Levine, E. G., Brown, S. L., Berry, J. W., & Hughes, G. H. (1987). Psychological, social, and health consequences of caring for a relative with senile dementia. Journal of American Geriatrics Society, 35, 405-411.

Hammen, C., Mayol, A., deMayo, R., & Marks, T. (1986). Initial symptom levels and the life-event-depression relationship. Journal of Abnormal Psychology. 95, 114-122.

Hardy, M. E. (1978). Perspectives on nursing theory. Advances in Nursing Science, 1(1), 27-48.

Heins, T. (1978). Marital interaction in depression. Australian and New Zealand Journal of Psychiatry, 12, 269.

Helson, H. (1964). Adaptation-Level Theory. New York: Harper & Row.

Hill, C. A. (1991). Seeking emotional support: The influence of affiliative need and partner warmth. Journal of Personality and Social Psychology, 60, 112-121.

Hinrichsen, G. A. & Ramirez, M. (1992). Black and white dementia caregivers: A comparison of their adaptation., adjustment, and service utilization. The Gerontologist, 32(3), 375-381.

Horowitz, A. (1985). Sons and daughters as caregivers to older parents: Differences in roles performance and consequences. The Gerontologist, 25, 612-617.

House, J. S. (1974). Occupational stress and coronary heart disease: A review and theoretical integration. Journal of Health and Social Behavior, 15, 12-27.

House, J. S. (1981). Work Stress and Social Support. Reading, MA: Addison-Wesley.

House, J. S. (1986). Americans' Changing Lives: Wave 1, 1986. Ann Arbor, MI: Servey Research Center.

Johnson, D. R., & Creech, J. C. (1983). Ordinal measures in multiple indicator models: A simulation study of categorization error. American Sociological Review, 48, 398-407.

Kaiser, H. F. (1974). An index of factor simplicity. Psychometrika, 39, 31-36.

Kaplan, R. M., & Toshima, T. (1990). The functional effects of social relationships on chronic illnesses and disability. In B. R. Sarason, I. B. Sarason, & G. R. Pierce (Eds.), Social Support: An interactional view (pp. 427-453). New York: John Wiley.

Kiecolt-Glaser, J. K., Glass, R., Shuttleworth, E. C., Dyer, C. S., Ogrocki, P., & Speicher, C. E. (1987). Chronic stress and immunity in family caregivers of Alzheimer's disease victims. Psychosomatic Medicine, 49, 523-535.

Kohout, F. J., Berkman, L. F., Evans, D., Cornoni-Huntley, J. (1993). Two shorter forms of the CES-D Depression Symptoms Index. Journal of Aging and Health, 5, 179-193.

Lawton, M. P., Rajagopal, D., Brody, E., & Kleban, M. H. (1992). The dynamics

of caregiving for a demented elder among black and white families. Journal of Gerontology, 47(4), S156-164.

Lawton, M. P. (1994). Broad-spectrium service program effect on caregivers. In E. Light, G. Niederehe, & B. D. Lebowitz (Eds.), Stress Effects on Family Caregivers of Alzheimer's Patients (pp. 138-155). New York: Springer Publishing Company.

Lawton, M. P., Moss, M., Kleban, M. H., Glicksman, A., & Rovine, M. (1991). A two-factor model of caregiving appraisal and psychological well-being. Journal of Gerontology, 46(4), P181-189.

Lazarus, R. S. (1966). Psychological Stress and the Coping Process. New York, McGraw-Hill.

Lazarus, R. S., & Delongis, A. (1983). Psychological stress and coping in aging. American Psychologist, 38(3),

Lazarus, R. S., & Folk, S. (1984). Stress, Appraisal, and Coping. New York: Springer.

Leamer, E. E. (1978). Specification Searches: Ad Hoc Inference With Non-Experimental Data. New York: Wiley.

Liang, J. (1986). The structure of self-reported health among the aged. Journal of Gerontology, 41, 248-260.

Liang, J., Lawrence, R. H., Bennett, J. M., & Whitelaw, N. (1990). Appropriateness of composites in structural equation models. Journal of Gerontology, 45, S52-S59.

Lieberman, M. A. & Fisher, L. (1995). The impact of chronic illness on the health and well-being of family members. The Gerontologist, 35(1), 94-102.

Long, J. S. (1983). Covariance Structure model: An introduction to LISREL. Beverly Hills: Sage publication.

Lopata, H. (1973). Widowhood in an American City. Cambridge. MA: Schenkman Publishing.

Lu, L. (1997). Social support, reciprocity, and well-being. Journal of social psychology, 137 (5), 618-28.

MacCallum, R. C. (1986). Specification searches in covariance structure modeling. Psychological Bulletin, 100, 107-120.

MacCallum, R. C., Brown, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. Psychological Methods, 1(2), 130-149.

MaloneBeach, E.E., & Zarit, S. H. (1995). Dimension of social support and social conflict as predictors of caregiver depression. International Psychogeriatrics, 7(1)25-38.

Marks, S. R. (1977). Multiple roles and role strain: some notes on human energy, time and commitment. American Sociological Review, 41, 921-936.

Marsden, P. V. (Ed.). (1981). Linear Model in Social Research. Beverly Hills, CA: Sage Publication.

Martire, L. M., Stephens, M. A., & Atienza, A. A. (1997). The interplay of work and caregiving: Relationships between role satisfaction, role involvement, and caregivers' well-being. Journal of Gerontology, 52B(5), S279-89.

Massey, V. H. (1990). Psychosocial adaptation to acute and chronic health problems during hospitalizatiion. Unpublished manuscript.

Max, W., Webber, p., & Fox, P. (1995). Alzheimer's disease: the unpaid burden of caring. Journal of Aging and Health, 7(2): 179-199.

McCulloch, B. J. (1990). The relationship of intergenerational reciprocity of aid to the morale of older parents: Equity and exchange theory comparisons. Journal of Gerontology, 45, S150-S155.

McDonald, R. P., & Marsh, H. W. (1990). Choosing a multivariate model: Noncentraity and goodness of fit. Psychological Bulletin, 107, 247-255.

Miller, B., & Cafasso, L. (1992). Gender differences in caregiving: Fact or artifact? The Gerontologist, 12(4), 498-507.

Miller, B., Campbell, R. T., Farran, C. J., Kaufman, J. E., & Davis, L. (1995). Race, control, mastery, and caregiver distress. Journal of Gerontology, 50B(6), S374-S382.

Mitchell, R. E., Cronkite, R. C., & Moos, R. H. (1983). Stress, coping, and the depression among married couples. Journal of Abnormal Psychology, 92, 433-448.

Montgomery, R. J. V., & Kamo, Y. (1989). Parent care by sons and daughters. In J. A. Mancini (Ed.), Aging Parents and Adult Children. Lexington, MA: Lexington.

Mosley, T. H. Jr. Payne, T. J., Plaud, J. J., Johnson, C. A., Wittrock, D. A., Seville, J. L., Penzien, D. B., & Rodriguez, G. (1996). Psychometric properties of the

Weekly Stress Inventory (WSI): extension to a patient sample with coronary heart disease. Journal of Behavioral Medicine, 19(3), 273-87.

Mui, A. C. (1992). Caregiver strain among black and white daughter caregivers: a role theory perspective. The Gerontologist, 32 (2), 203-212.

Mui, A. C. (1995a). Caring for frail elderly parents: A comparison of adult sons and daughters. The Gerontologist, 35 (1), 86-93.

Mui, A. C. (1995b). Perceived health and functional status among spouse caregivers of frail older persons. Journal of Aging and Health, 7(2), 283-300.

Mui, A.C., & Morrow-Howell, N. (1993). Sources of emotional strain among the oldest caregivers. Research on Aging, 15(1), 50-69.

Mulaik, J. A., James, L R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, D. (1989). Evaluation of goodness-of-fit indices for structural equation models. Psychological Bulletin, 105, 430-445.

Neugarten, B. L., & Weinstein, K. K. (1964). The changing American grandparent. Journal of Marriage and the Family, 26, 299-304.

Nielson, E., Brown, G. H., & Marmot, M. (1989). Myocardial infarction. In G. W. Brown & T. O. Harris (Eds.), Life Events and Illness. New York: Guilford Press.

Nunnally, J. C. (1978). Psychometric Theory (2 nd ed.). New York: McGraw-Hill.

Okun, M. A., Sandler, I. N., & Baumann, D. J. (1988). Buffer and booster effects as event-support transactions. American Journal of Community Psychology, 16, 435-449.

Paykel, E. S. (1974). Life stress and psychiatric disorder. In B. S. Dohrenwend & B. P. Dohrenwend (Eds.), Stressful Life Events: Their Nature and Effects. New York: John Willey.

Pearlin, L. (1989). The sociological study of stress. Journal of Health and Social Behavior, 30, 241-256.

Pearlin, L. I. (1994). Conceptual strategies for the study of caregiver stress. In E. Ligh, G, Niederehe, & B. D. Lebowitz (Eds.), Stress Effects on Family Caregivers of Alzheimer's Patients, Research and Interventions. New York, NY: Springer Publishing Company.

Pearlin, L. I., Lieberman, M. A., Menaghan, E., & Mullan, J. T. (1981). The stress process. Journal of Health and Social Behavior, 22, 337-356.

Pearlin, L. I., Mullan, J. T., Semple, S. J., & Skaff, M. M. (1990). Caregiving and the stress process: an overview of concepts and their measures. The Gerontologist, 30(5), 583-594.

Pollock, S. E. (1986). Human responses to chronic illness: physiologic and psychological adaptation. Nursing Research, 35(2), 90-95.

Pollock, S. E. (1989). Adaptive responses to diabetes mellitus. Western Journal of Nursing Research, 11(3), 265-280.

Pollock, S. E. (1993). Adaptation to chronic illness. A program of research for testing nursing theory. Nursing Science Quarterly, 6(2), 86-92.

Potashnik, S. L. (1988). Spouse Caregiving: The Impact of Stressors and Perceptions on Well-being. Desseration, The University of Michigan.

Preston, D. B., & Dellasega, C. (1990). Elderly women and stress, Does marriage make a difference? Journal of Gerontological Nursing, 16(4), 27-32

Prince, M. J., Harwood, R. H., Blizard, R. A., Thomas, A., Mann, A. H. (1997). Social support deficits, loneliness and life events as risk factors for depression in old age. The Gospel Oak Project VI. Psychological Medicine, 27(2), 323-32.

Pruchno, R. A., & Potashnik, S. L. (1989). Caregiving spouse: Physical and mental health in perspective. Journal of American Geriatric Society, 37, 697-705.

Pruchno, R. A., & Resch, N. L. (1989a). Husbands and wives as caregivers: Antecedents of depression and burden. The Gerontologist, 29, 159.

Pruchno, R. A., Kleban, M. H., Michaels, E., & Dempsey, N. P. (1990). Mental and physical health of caregiver spouses. Journal of Gerontology, 45 (5), P192-199.

Pruden, E. P. S. (1991). Roy Adaptation Model Testing: Dyadic Adaptation, Social Support, and Loneliness in COPD Dyads. Doctoral Dissertation, University of South Carolina.

Quayhagen, M. P., & Quayhagen, M. (1988). Alzheimer's stress: coping with the caregiving role. The Gerontologist, 28(3), 391-396.

Rabkin, J. G. (1993). Stress and psychiatric disorders. In L. Goldberger & S. Breznitz (Eds.), Handbook of Stress. New York, NY: The Free Press.

Radloff, L. S. (1977). The CES-D Scale: A self-reported depression scale for research in the general population. Applied Psychological Measurement, 1, 385-401.

Rankin, E. D., Haut, M. W., and Keefover, R. W. (1992). Clinical assessment of family caregivers in dementia. The Gerontologist, 32(6), 813-821.

Robert, R. E., Kaplan, G. A., Shema, S. J., Strawbridge, W. J. (1997). Does growing old increase the risk for depression? American Journal of Psychiatry, 154(10), 1384-90.

Robinson, J. H. (1991). A Descriptive Study of Widows' Grief Responses, Coping Processes and Social Support within Roy's Adaptation Framework. Doctoral Dissertation. Wayne State University.

Robison, J., Moen, P., Dempster-McClain, D. (1995). Women's caregiving: Changing profiles and pathways. Journal of Gerontology, 50B(6), S362-S373.

Rogers, M. (1961). Educational Revolution in Nursing. New York: Macmillan.

Roy, C & Roberts, S. L. (1981). Theory Construction in Nursing: An Adaptation Model. Englewood Cliffs, NJ: Prentice-Hall.

Roy, C. (1976). Introduction to Nursing: An Adaptation Model. Englewood Cliffs, NJ: Prentice-Hall.

Roy, C. (1980). The Roy adaptation model. In J. P. Riehl & C. Roy (Eds.), Conceptual Models for Nursing Practice (2nd ed). New York: Appleton-Century-Crofts.

Roy, C. (1984). Introduction to Nursing: An Adaptation Model (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Roy, C. (1988). An explication of the philosophical assumptions of Roy Adaptation Model. Nursing Science Quarterly, 1, 26-34.

Roy, C., & Corliss C. P. (1993). The Roy Adaptation Model: Theoretical update and knowledge for practice. In M. E. Parker (Ed.) Patterns of Nursing Theories In Practice. New York: National League for Nursing Press.

Roy, C., & McLeod, D. (1981). Theory of the person as an adaptive system. In C. Roy, & S. L. Roberts (Eds). Theory Construction in Nursing: An Adaptation Model. Englewood Cliffs, NJ: Prentice-Hall.

Rushing, B., Ritter, C., & Burton, R. (1992). Race Differences in the effects of multiple roles on health: Longitudinal evidence from a national sample of older men. Journal of Health and Social Behavior, 33, 126-139.

Sahlins, M. D. (1965). On the sociology of primitive exchange. In M. Banton (Ed.), The relevance of models for social anthropology. Travistock, London.

Sarason, I. G., & Sarason, B. R. (1985). Social Support: Theory, research and application (pp. 3-20). Dordrecht, The Netherlands: Martinus Nijhoff.

Sarason, I. G., Hohnson, J. H., Siegel, J. M. (1978). Assessing the impact of life changes: Development of the life experiences survey. Journal of Consulting and Clinical Psychology, 46, 932-946.

Sato, M. K. (1991). Protection. In C. Roy & H. A. Andrews (Eds), The Roy Adaptation Model. The definitive statement (pp. 149-164). Norwalk, CT: Appleton & Lange.

Schroeder, D. H. & Costa, P. T. Jr. (1984). Influence of life event stress on physical illness: substantive effects or methodological flaws? Journal of Personality and Social Psychology, 46(4), 853-63.

Schulz, R. (1990). Theoretical perspectives on caregiving, in D. E. Biegel, and A. Blum, (Eds.), Aging and Caregiving: Theory, Research, and Policy. Newbury Park, CA: Sage.

Shrout, P. E., & Yager, T. J. (1989). Reliability and validity of screen scales: Effects of reducing scale length. Journal of Clinical Epidemiology, 42, 69-78.

Shuler, P. J. (1990). Physical and psychosocial adaptation, social isolation, loneliness, and self-concepts of individual with cancer. The Catholic University of America. Dissertation.

Shumaker, S., & Brownell, A. (1984). Toward a theory of social support: Closing conceptual gaps. Journal of Social Issues, 40(4), 11-36.

Sieber, S. (1974). Toward a theory of role accumulation. American Sociological Review, 39, 567-364.

Silva, M. C. (1986). Research testing nursing theory: state of the art. Advances in Nursing Science, 9(1): 1-11.

Skaff, M. M., & Pearlin, L. I. (1992). Caregiving: role engulfment and the loss of self. The Gerontologist, 32(5), 656-664.

Slater, P. (1963). On social regression. American Sociological Review, 28, 339-364.

Smith, B. J. A. (1989). Caregiver Burden and Adaptation in Middle-Aged Daughters of Dependent, Elderly Parents: A Test of Roy's Model. Doctoral Dissertation, University of Pittsburgh.

Smith, C. E., Moushey, L., Ross, J. A., & Gieffer, C. (1993). Responsibilities and reactions of family caregivers of patients dependent on total parental nutrition at home. Public Health Nursing, 10(2), 122-128.

Stein, J. (Ed.). (1988). The Random House College Dictionary (Revised ed.). New York: Random House, Inc.

Stephens, M. A., & Townsend, A. L. (1997). Stress of parent care: positive and negative effects of women's other roles. Psychology & Aging, 12(2), 376-86.

Stephens, M. A., Franks, M. M., & Townsend, A. L. (1994). Stress and rewards in women's multiple roles: The case of women in the middle. Psychology & Aging, 9(1), 45-52.

Stewart, M. J. (1993). Integrating Social Support in Nursing. Newbury Park, CA: Sage

Stoller, E. P., & Earl, L. L. (1983). Help with activities of everyday life: Sources of support for the noninstitutionalized elderly. The Gerontologist, 23, 64-69.

Stone, A. A., Bovbjerg, D. H., Neale, J. M., Napoli, A., Valdimarsdottir, H., Cox, D., Hayden, F. G., Gwaltney, J. M. Jr. (1992). Development of common cold symptoms following experimental reinovirus infection is related to prior stressful life events. Behavioral Medicine, 18(3), 115-20.

Stone, R., Cafferata, G. L., & Sangl, J. (1987). Caregivers of the frail elderly: a national profile. The Gerontologist, 27(5), 616-626.

Stone, R., Cafferata, G. L., & Sangl, M. P. H. (1987). Caregivers of frail elderly: A national profile. The Gerontologist, 27, 616-626.

Strohmyer, L. L., Noroian, E. L., Patterson, L. M., & Carlin, B. P. (1993). Adaptation six months after multiple trauma: A pilot study. Journal of Neuroscience Nursing, 25(1), 30-36.

Stroller, E. P. (1983). Parental caregiving by adult children. Journal of Marriage and the Family, 45, 851-858.

Stroller, E. P. (1985). Exchange patterns in the informal networks of the elderly: The impact of reciprocity on morale. Journal of Marriage and the Family, 47, 335-342,

Talkington-Boyer, S., & Snyder, D. K. (1994). Assessing impact on family caregivers to Alzheimer's disease. The American Journal of Family Therapy, 22, 57-66.

Tedrow, M. P. (1991). Overview of the interdependence mode. In C. Roy & H. A. Andrews (Eds), The Roy Adaptation Model. The definitive statement, (pp. 385-404). Norwalk, CT: Appleton & Lange.

Tennant, C. C., Langeluddecke, P. M., Fulcher, G., & wilby, J. (1988). Acute and chronic life event stress in coronary atherosclerosis. Journal of psychosomatic Research, 32(1), 13-20.

Tennstedt, S. L., McKinlay, J. B., & Sullivan, L. M. (1988). Informal care for frail elderly: The role of secondary characteristics. Paper presented at the Annual Scientific Meeting of the Gerontological Society of America, San Francisco, CA.

Thoits, P. A. (1982). Conceptual, methodological, and theoretical problems in studing social support as a buffer against life stress. Journal of Health and Social Behavior, 23, 145-159.

Thoits, P. A. (1983a). Theoretical distinctions between causal and interaction effects of social support. Journal of Health and Social Behavior, 24, 91-94.

Thoits, P. A. (1983b). Multiple identities and psychological well-being. American Sociological Review, 48, 174-187.

Thompson, E. H., & Doll, W. (1982). The burden of families coping with mental ill: An invisible crisis. Family Relations, 31, 379-388.

Thompson, E. H., Futterman, A. M., Gallagher-Thompson, D., Rose, J. M., & Lovett, S. B. (1993). Social support and caregiving burden in family caregivers of frail elders. Journal of Gerontoology, 48(5), S245-254.

Tousignant, M., & Maldonado, M. (1989). Sadness, depression and social reciprocity in Highland Ecuador. Social Science & Medicine, 28(9), 899-904.

Townsend, A., Noelker, L., Diemling, G., & Bass, D. (1988). The Longitudinal Impact of Cargiving on Adult-Child Caregivers' Mental Health. Cleveland, OH: The Benjamin Rose Institute.

Troll, L., Miller, S., & Atchley, R. (1979). Family in Later Life. Belmont, CA: Wadsworth.

Tulman, L. & Fawcett, J. (1990a). Maternal employment following childbirth. Research in Nursing & Health, 13, 181-188.

Tulman, L., Fawcett, J., Groblewski, L., & Silverman, L. (1990b). Changes in functional status after childbirth. Nursing Research, 39,(2) 70-75..

Turner R. J. & Avison, W. R. (1992). Innovations in the measurement of life stress: crisis theory and the significance of event resolution. Journal of Health and Social Behavior, 33(1), 36-50.

Turner, R. J. (1981). Social support as a contingency in psychological well-being. Journal of Health and Social Behavior, 22, 357-367.

Verbrugge, L. M. (1987). Role responsibility, role burdens, and physical health. In F. J. Crosby (Ed.), Spouse, Parent, Worker: On Gender and Multiple Roles. New Haven, CT: Yale university Press.

Waldron, I., & Jacobs, J. A. (1989). Effects of multiple roles on women's health-Evidence from a national longitudinal study. Women and Health, 15, 3-19.

Warren, B. J. (1997). Depression, stressful life events, social support, and self-esteem in middle class African American women. Archives of Psychiatric Nursing, 11(3), 107-17.

Wentkowski, G. J. (1981). Reciprocity and the coping strategies of older people: Cultural dimensions of network building. The Gerontologist, 21, 600-609.

White-Means, S. (1993). Informal home care for frail black elderly. The Journal of Applied Gerontology, 12 (1), 18-33.

Williamson, G. M., & Schulz, R. (1993). Coping with specific stressors in Alzheimer's disease caregiving. The Gerontologist, 33(6), 747-754.

Wortman, C. B. (1984). Social support and cancer: Conceptual and methodological issues. Cancer, 53, 2339-2360.

Young, R. F., & Kahana, E. (1989). Specifying caregiver outcomes: Gender and relationship aspects of caregiving strain. The Gerontologist, 29(5), 660-666.

Zarit, S.H., Todd, P. A., & Zarit, J. M. (1986). Subjective burden of husbands and wives as caregivers: a longitudinal study. The Gerontologist, 26(3), 260-266).

ABSTRACT

DEVELOPMENT OF A MIDDLE-RANGE THEORY OF CAREGIVER STRESS FROM THE ROY ADAPTATION MODEL

by

PAO-FENG TSAI

December 1998

Advisor: Dr. Mary Jirovec

Major: Nursing

Degree: Doctor of Philosophy

A theory of caregiver stress derived from Roy Adaptation Model was developed to examine the relationships among stimuli, coping mechanism and adaptive modes. The theory hypothesized that objective burden in caregiving would be the most important stimulus that leaded to perceived caregiver stress. Higher perceived caregiver stress would result in ineffective responses (poor health function, lower self-esteem/mastery, role enjoyment, and marital satisfaction, and less ability to reciprocate). These adaptive modes should be interrelated. In addition, this study also examined the role of depression and the function of contextual stimuli in the model. However, statistical analysis did not support the initial RAM-derived theory. The primary model was modified by reevaluating the relations among constructs in empirical data using structural equation modeling. The robustness of the final data-derived model was further partially cross-validated with another sample and was further simplify.

The findings showed that (a) Objective burden in caregiving and perceived

caregiver stress were not the most important determinants of their outcomes in the context of chronic caregiving; (b) Perceived caregiver stress and depression were related yet distinct concepts in predicting caregivers' outcomes; (c) Depression was the most easily aroused outcome of perceived caregiver stress; (d) Contextual stimuli did not have either the main effect on perceived caregiver stress or a moderated effect on the relation between objective burden in caregiving and perceived caregiver stress. Instead, they influenced caregivers' outcomes directly; (e) Gender was the only residual stimulus that was found to predict perceived caregiver stress. Residual stimuli in this study played more important roles in predicting focal stimuli, contextual stimuli, depression, and adaptive modes; and (f) There were no causal relationships among adaptive modes; instead, adaptive modes were either predicted by depression, contextual stimuli, or residual stimuli.

The results provide valuable insights to the RAM as well as caregiving knowledge. It also pointed out the importance of using secondary data analysis and structural equation model in nursing research.

AUTOBIOGRAPHICAL STATEMENTS

Pao-Feng Tsai

EDUCATION

Nursing (Ph.D.) College of Nursing, Wayne State University	December, 1998 Detroit, MI
Nursing (MSN) College of Nursing, Wayne State University	December, 1996 Detroit, MI
Public Health (MS) Institute of Public Health, National Yang-Ming Medical College	June, 1987 Taipei, Taiwan, R.O.C.
Nursing (BS) Kaohsiung Medical College	June, 1984 Kaohsiung, Taiwan, R.O.C.
Nursing & Midwifery (Associate) National Taipei Nursing College	June 1982 Taipei, Taiwan, R.O.C.

SCHOLARSHIPS OR AWARDS

1992-1993 and 1996-1997 Thomas C. Rumble University Graduate Fellowship, Wayne State University, Detroit, Michigan

PUBLICATION

1. Horgas, A., & Tsai, P. (1998). Analgesic drug prescription and use in cognitively impaired nursing home residents. Nursing Research, 47(4), 235-242.
2. Chapleski, E., Lichtenberg, P., Dwyer, J., Youngblade, L., & Tsai, P. (Accepted, 1997). Morbidity and Comorbidity among Great Lakes American Indians: Predictors of functional ability. The Gerontologist.
3. Chou, P., Tsai, P., & Song, L. (1993). Analysis of factors related to treatment and prognosis of leprosy patients in southern Taiwan. Chinese Medical Journal (Taipei), 52, 1-8.
4. Tsai, P. (1991). The utilization of social resources in home care nursing. VGH Nursing 8(2), 211-215.
5. Tsai, P., & Chou, P. (1991). The knowledge and attitude of leprosy in junior high school teachers. Public Health 17. 379-388.
6. Tsai, P., Chiang, T., & Ye, M. (1989). Changing values of nursing in Taiwan. Public Health 16, 138-148.
7. Tsai, P., & Chou, P. (1989). Epidemiological study on leprosy patients in southern Taiwan. Public Health, 16, 283-300.
8. Tsai, P., & Chou, P. (1988). Review of literature of leprosy. Public Health, 15, 328-347.