EXAMINATION OF THE TRANSTHEORETICAL MODEL
AND PHYSICAL ACTIVITY IN FAMILY CAREGIVERS
IN TAIWAN

by
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ABSTRACT

The purposes of this descriptive, correlational, and cross-sectional study were to (a) determine whether constructs from the transtheoretical model (TTM) are applicable to Taiwanese family caregivers relative to regular physical activity and (b) explore the factors that affect constructs from the TTM (e.g., stages of change, self-efficacy, perceived benefits, and perceived barriers).

One hundred eight primary family caregivers of mentally ill patients receiving home care from a psychiatric hospital in Tainan City, Taiwan, completed the questionnaire at home. Findings indicated that caregivers in later stages of the TTM (e.g., action or maintenance) had significantly higher levels of self-efficacy and perceived benefits of regular physical activity than those in earlier stages (e.g., precontemplation). There were no significant differences in the level of perceived barriers across the different stages. This study provides partial support for the hypothesized relationships between constructs derived from the TTM. The results also provide evidence for relationships between constructs from the TTM and some demographic variables (i.e., age, marital status, relationship to patient, perception of physical activity, the number of hours employed outside the home, the amount of time spent in caregiving, hours of physical activity for the past 2 weeks, and health perception). This study reveals that these demographic factors and cultural issues may play a critical role in physical activity behavior among Taiwanese family caregivers and need to be further investigated.
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CHAPTER 1

INTRODUCTION

Background

Considerable evidence has found that regular physical activity can yield a number of physiological and psychological benefits. Physiological benefits include reduced risk of coronary heart disease, hypertension, diabetes mellitus, colorectal cancer, obesity, and osteoporosis. Regular physical activity has also been shown to have positive psychological benefits, such as a reduction in stress and depression. Also participating in physical activity tends to have a positive effect on emotional well-being, energy level, self-confidence, and satisfaction in social relationships (U.S. Department of Health and Human Service, 1996).

Despite the reported health benefits of physical activity, the U.S. Surgeon General (1996) has reported that up to 60% of American adults are not active enough to gain health benefits, and 25% are completely sedentary. In Taiwan, only 35% of adults report engaging in regular physical activity (Tsai, 1998). Moreover, the leading causes of mortality in the past decade among the Taiwanese people are hypertension, diabetes mellitus, and heart disease (Department of Health of the Executive Yuan of Taiwan, 2002). Prevention of these diseases may be possible with lifestyle change--primarily an increase in regular physical activity. The studies cited above indicate that the problem of physical inactivity is pervasive, and the resultant health risk is significant.
This study is concerned more specifically with the effects of regular physical activity in relation to the health of family caregivers of mentally ill patients in Taiwan. In Taiwan, home care by family caregivers plays a significant role in the treatment of mentally ill patients. Families are expected to take on the bulk of responsibility for caring for a mentally ill individual because of Chinese cultural expectations and obligations (Wen, 1990). Data from my thesis have shown that the demands on a caregiver continue over a long period of time. The average duration of providing care for a mentally ill family member was 9.7 years (Tung, 1998). Further, in order to provide comprehensive care, more than 90% of family caregivers live with their mentally ill family member while he or she is in a home care program (S. L. Chang, personal conversion, April 16, 2002). Due to the duration and burden associated with caring for a mentally ill family member at home, caregivers may experience chronic stress—not only physically but also emotionally, financially, and culturally. This prolonged stress may put the caregiver's health at risk.

Given that the benefits of regular physical activity could significantly offset the negative effects of stress on family caregivers, it is essential that health professionals discover the factors that affect regular physical activity of family caregivers. To better understand the process by which individuals change their lifestyles in order to incorporate regular physical activity, some researchers have applied the transtheoretical model (TTM), which views regular physical activity as a dynamic and multidetermined process. The TTM, developed by Prochaska and DiClemente (1983), acknowledges that people differ in their readiness to adopt new behaviors. That readiness can be better understood
in terms of the following key constructs: (a) stages of change, (b) self-efficacy, and (c) decisional balance.

The TTM suggests that individuals adopting a new behavior go through five stages of readiness to change: (a) precontemplation, (b) contemplation, (c) preparation, (d) action, and (e) maintenance. As applied to regular physical activity, the stages range from the earliest stage, “precontemplation (not engaged in regular physical activity and has no intention to change in the next 6 months),” to the last stage, “maintenance (engages in regular physical activity for more than 6 months).”

Self-efficacy is the second construct of the TTM and is defined as a judgment regarding one’s ability to perform a behavior required to achieve a certain outcome (Bandura, 1997). Self-efficacy is hypothesized to be related to individuals’ stages of change, with individuals in later stages of the TTM exhibiting higher self-efficacy than those in earlier stages (Prochaska, Redding, & Evers, 2002). This means that people in later stages of the TTM feel more confident in their ability to sustain regular physical activity compared to people in earlier stages.

The third construct of the TTM is decisional balance, which involves an evaluation of the perceived "pros" (benefits) and "cons" (barriers) of continuing a current behavior or adopting a new behavior. According to the TTM, the cons (barriers) outweigh the pros (benefits) in the precontemplation stage; however, the pros and cons become equally salient in the contemplation or preparation stages. During action and maintenance, the pros outweigh the cons as the new behavior becomes part of one's lifestyle (Prochaska et al., 2002). Generally, people in the earlier stages perceive greater barriers, whereas people in the later stages perceive greater benefits.
Research thus far on the TTM in connection with physical activity has supported these relationships between stages of change, self-efficacy, and decisional balance (Gorely & Gordon, 1995; Herrick, Stone, & Mettler, 1997; Laffrey, 2000; Marcus & Owen, 1992; Marcus, Rakowski, & Rossi, 1992; Plotnikoff, Hotz, Birkett, & Courneya, 2001). Also, interventions that have incorporated the constructs of the TTM have been shown to be effective for increasing the adoption of regular physical activity (Bock, Marcus, Pinto, & Forsyth, 2001; Calfas et al., 1996; Calfas et al., 2002; Cardinal & Sachs, 1995; Jones, DellaCorte, Nigg, Clark, & Burbank, 2001; Marcus, Banspach, et al., 1992; Marcus et al., 1998; Mau et al., 2001; Pinto, Lynn, Marcus, DePue, & Goldstein, 2001; Renger, Steinfelt, & Lazarus, 2002; Steptoe, Rink, & Hilton, 2001; Young, King, Sheehan, & Stefanick, 2002).

Numerous studies have examined the TTM as applied to physical activity behavior across a wide range of populations, including different worksite groups (e.g., medical, industrial, retail, and government), age-groups (e.g., preadolescents, adolescents, adults, and older adults), gender-groups (e.g., women), medical conditions (e.g., overweight, hypertension, diabetes, dyslipidemia, and heart disease), and countries (e.g., Australia, Canada, China, Japan, Mexico, the Pacific Islands, the UK, and the USA) (Booth et al., 1993; Boyle, O'Connor, Pronk, & Tan, 1998; Buckworth & Wallace, 2002; Burke et al., 2000; Callaghan, Eves, Norman, Chang, & Lung, 2002; Cardinal, Engels, & Zhe, 1998; Gonzalez & Jirovec, 2001; Gorely & Gordon, 1995; Herrick et al., 1997; Laffrey, 2000; Lee, 1993; Marcus & Owen, 1992; Marcus, Rakowski, et al., 1992; Marcus, Rossi, Selby, Niaura, & Abrams, 1992; Nigg, 2001; Nigg & Courneya, 1998; Pinto, 1995; Plotnikoff et al., 2001; Rodgers, Courneya, & Bayduza, 2001; Sarkin,
Johnson, Prochaska, & Prochaska, 2001; Simmons & Mesui, 1999; Suminski & Petosa, 2002; Tucker & Reicks, 2002; Wakui et al., 2002; Walton et al., 1999). However, there has been a lack of research on the applicability of the TTM to the Taiwanese people. Even more specifically, no studies have applied the TTM to the population of individuals caring for a relative with mental illness at home.

Discovering the factors that affect the regular physical activity of family caregivers of mentally ill patients in Taiwan and examining the applicability of the TTM to these caregivers could have significant impacts on the health of caregivers, as well as on the health of the mentally ill patients for whom they care. This information could lead to an understanding of the initiation of regular physical activity and could be used to enhance the development of physical activity interventions for family caregivers in the future.

**Statement of Problem**

Family caregivers living with a mentally ill relative who is receiving home care are likely to experience more distress in their lives. Unfortunately, no empirical studies exist related to the health issues of family caregivers caring for a mentally ill patient who is receiving home care. Findings from the United States suggest that family caregivers experience poorer mental and physical health in comparison to noncaregivers or normative data (Clark & Bond, 2000; Fuller-Jonap & Haley, 1995; Haley et al., 1995; McNaughton, Patterson, Smith, & Grant, 1995; McPherson, Pentland, & McNaughton, 2000). Additionally, family caregivers are less likely than same-aged peers to engage in health behaviors that are important for chronic disease prevention and control, such as
Because of the likelihood that family caregivers will suffer poor health or are less likely to participate in regular physical activity, health professionals should address those factors that influence family caregivers' physical activity behaviors. However, reported studies have not specifically addressed physical activity behaviors of family caregivers for mentally ill patients currently receiving home care in Taiwan or in any other country. Factors that affect regular physical activity among family caregivers in an unstructured home setting without supervision, peer support, and equipment availability are still unknown.

Attention to regular physical activity would seem to contribute to the health and well-being of family caregivers. However, the health issues of family caregivers specific to physical activity behavior appear to be largely ignored by health care professionals and researchers. If a family caregiver develops an illness, those who rely on his or her care may subsequently receive less care or be forced to rely on expensive and scarce institutional care providers. If the health issues of family caregivers are overlooked, the results might be overwhelming to the already suffering National Health Insurance in Taiwan and to the health care system in the United States. Therefore, to prevent future burdens on the health care system, it is essential to plan effective services to help caregivers implement regular physical activity; this in turn requires exploring the factors that influence caregivers to adopt regular physical activity.

In addition, because almost everyone, regardless of age or health conditions, engages in some activities on a daily basis, determining an individual's level of readiness
for a regularly active lifestyle and identifying the activities that an individual already performs can serve as an important starting point for studying physical activity (Laffrey, 2000). Therefore, an understanding of the applicability of the TTM in Taiwan is needed before planning interventions.

**Significance to Nursing**

In Taiwan and the United States, nurses are the largest group of professional providers of home health care (Barkaukas, 1990). They are also the primary providers of home health care services. Nurses are therefore in a good position to assess the physical activity behavior of family caregivers for mentally ill patients currently receiving home care. Through assessment and evaluation of the TTM and of the physical activity of family caregivers, nurses can anticipate problems, employ prevention strategies, and promote caregivers’ health. Evaluation of the TTM will also allow nurses to develop and propose effective physical activity programs for the family caregivers if appropriate.

**Purpose**

The main purposes of this descriptive, correlational, and cross-sectional study were as follows: (a) to determine whether constructs from the TTM are applicable to Taiwanese family caregivers relative to regular physical activity and (b) to explore the factors that affect constructs from the TTM (e.g., stages of change, self-efficacy, perceived benefits, and perceived barriers).

**Research Hypotheses/Questions**

A series of research hypotheses and questions related to the main purposes of the study were investigated.
Purpose (1)

The purpose was to determine whether constructs from the TTM are applicable to Taiwanese family caregivers relative to regular physical activity.

Hypothesis (1A)

Caregivers who are in later stages of the TTM (e.g., action or maintenance) will show a significantly higher level of self-efficacy relative to regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Hypothesis (1B)

Caregivers who are in later stages of the TTM (e.g., action or maintenance) will perceive significantly more benefits of regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Hypothesis (1C)

Caregivers who are in later stages of the TTM (e.g., action or maintenance) will perceive significantly fewer barriers to regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Purpose (2)

The purpose was to explore the factors that affect constructs from the TTM (e.g., stages of change, self-efficacy, perceived benefits, and perceived barriers).

Question (2A)

What is the relationship between caregivers’ stages in the TTM and caregivers’ demographics (i.e., age, body mass index (BMI) (kg/m²), the amount of time spent in
caregiving, working hours, gender, relationship to patient, religion, marital status, educational level, monthly income, the amount of support caregivers received from other family members for caregiving, disease history, perceived health, perception of physical activity, and hours of physical activity for the past 2 weeks)?

**Question (2B-1)**

What is the relationship between the level of self-efficacy relative to regular physical activity and caregivers' demographics (i.e., age, BMI (kg/m$^2$), the amount of time spent in caregiving, working hours, educational level, monthly income, the amount of support caregivers received from other family members for caregiving, perceived health, and hours of physical activity for the past 2 weeks)?

**Question (2B-2)**

What is the difference in the level of self-efficacy relative to regular physical activity among demographic subgroups of caregivers (i.e., gender, relationship to patient, religion, marital status, disease history, and perception of physical activity)?

**Question (2C-1)**

What is the relationship between the level of perceived benefits of regular physical activity and caregivers’ demographics?

**Question (2C-2)**

What is the difference in the level of perceived benefits of regular physical activity among demographic subgroups of caregivers?
Question (2D-1)

What is the relationship between the level of perceived barriers to regular physical activity and caregivers' demographics?

Question (2D-2)

What is the difference in the level of perceived barriers to regular physical activity among demographic subgroups of caregivers?
CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

In the United States, there have been numerous articles and reports published on physical activity over the past decade. In contrast, little work has been done to assess general physical activity among Taiwanese people. Even in the United States, few have investigated physical activity among family caregivers, and studies of caregivers’ physical activity have not specifically addressed family caregivers of mentally ill patients. Similarly, no research has been done to assess physical activity of family caregivers in Taiwan.

Research using the TTM has studied adolescents, adults, seniors, women, patients, students, and workers in Australia, Canada, China, Japan, Mexico, the Pacific Islands, the UK, and the USA, but the TTM has not been used to assess physical activity of family caregivers in Taiwan or any other countries.

Due to the scarcity of literature focusing on the physical activity of family caregivers of mentally ill patients or evaluating the applicability of the TTM to Taiwan, articles on any studies related to physical activity, exercise, and the TTM were explored. The literature review includes (a) factors influencing caregivers’ physical activity and exercise, (b) assessments of physical activity and exercise in Taiwan, (c) characteristics of family caregivers in Taiwan, and (d) the TTM and physical activity and exercise.
Factors Influencing Caregivers' Physical Activity and Exercise

Only limited research has looked at factors influencing caregivers’ physical activity and exercise behavior, and that literature focuses on caregivers in the United States. There are no published studies documenting caregivers’ physical activity and exercise behavior in Taiwan. However, a review of several cross-sectional studies from the United States on family caregivers’ health behaviors and physical activity follows.

Sisk (2000) investigated whether the perception of burden and caregivers’ demographic factors were related to health-promoting behaviors. The study included 121 family caregivers of home care patients who had Alzheimer’s disease or related dementia. The Health Promoting Lifestyle Profile (HPLP) (Walker, Sechrist, & Pender, 1987) was used for these study participants. The HPLP has six subscales to measure health behaviors: exercise, self-actualization, health responsibility, nutrition, interpersonal support, and stress management. The results showed that exercise was the least frequently practiced health behavior compared to other health behaviors. Older caregivers participated in less exercise than younger caregivers. Moreover, caregivers who perceived more objective burdens performed less exercise than those who perceived fewer objective burdens. Objective burden was defined in this study as a disruption or change in some aspect of the caregivers’ life and household, such as time or health occasioned by the need to provide care (Montgomery, Gonyea, & Hooyman, 1985).

Using the same instrument (Walker et al., 1987), O'Brien (1993), in a pilot study of caregivers of individuals with multiple sclerosis, examined the health-promoting behaviors of 20 spousal primary caregivers with a mean age of 52 years. Similar to the findings of Sisk (2000), exercise was reported as the least frequent health behavior
practiced by both husband and wife caregivers. A significant inverse relationship was found between the level of care recipient’s dependency and the caregiver’s health-promoting behaviors, indicating that the caregivers employed fewer health-promoting behaviors with increased dependency of the care recipient. In addition, the total HPLP score for wife caregivers was higher than that for husband caregivers, indicating that female caregivers employed more health-promoting behaviors than their male counterparts.

Burton et al. (1997) compared preventive health behaviors among three groups of spousal caregivers for functionally impaired patients. The three groups included 212 caregivers with high levels of caregiving, 222 caregivers with moderate levels of caregiving, and 385 noncaregivers as a control group. Burton and colleagues reported that caregivers with high levels of caregiving responsibilities performed less exercise compared to noncaregivers. Males were more likely to engage in exercise than females. Participants without a high school diploma engaged in more exercise than those with a high school diploma.

Gallant and Connell (1997), in a mailed survey of 233 spousal caregivers for patients with dementia, found that caregivers with a lower level of self-efficacy displayed more negative health behaviors than those who had a higher level of self-efficacy. Female caregivers participated in less physical activity than male caregivers, which is consistent with the findings by Burton et al. (1997). There was no significant relationship between age and physical activity. This contradicts previous research (Sisk, 2000) that showed an association between age and physical activity.
To provide more information about how caregivers changed their lifestyles over the course of caregiving, qualitative research by Periard and Ames (1993) used structured and open-ended questions as well as interviewers' notes and observations among 20 caregivers for first-time stroke survivors in the early poststroke period. Qualitative analysis revealed two primary issues among caregivers: time and confinement. Periard and Ames found that caregivers engaged in less physical activity than before they took on caregiving roles. These changes in physical activity resulted from the lack of time and an inability to get out of the house due to caregiving.

The studies reviewed here suggest that caregivers' health behaviors and physical activity were associated with caregivers' demographic characteristics (e.g., age, educational level, and gender), caregivers' self-efficacy, the dependency level of the care recipient, and caregivers' perception of time and confinement related to caregiving responsibilities. These factors, however, had no consistent correlation with health behaviors or physical activity. In addition, due to the cross-sectional nature of these studies, the causal relationships between these factors and health behavior—specifically, physical activity—remain unknown. It is also unclear to what extent the study participants' usual behaviors were altered when they took on caregiving roles. Nevertheless, with the lack of study of physical activity among family caregivers in Taiwan and the lack of consistency in the findings of existing caregiver literature, these factors related to physical activity or health behaviors need to be further explored among Taiwanese family caregivers.
Assessments of Physical Activity and Exercise in Taiwan

No information is available regarding Taiwanese family caregivers' level of physical activity. Only three relevant studies of exercise behavior among Taiwanese people were reported in journals (Tsai, 1998; Wang, 1998; Wang, Chiou, Wang, & Lee, 1992).

Wang and colleagues (1992) studied the determinants of health behaviors among 203 adult women from urban communities and 256 adult women from rural communities in southern Taiwan. The health behavior questionnaire was modified from the lifestyle and health habit assessment (Pender, 1987), which contained 10 subscales. The researchers found that women from both urban and rural communities had their lowest scores on the physical activity subscale, indicating that physical activity was the least frequently practiced behavior compared to other health behaviors. This result echoes the findings of U.S. caregiver literature by O'Brien (1993) and Sisk (2000). The investigation also showed that women who perceived themselves as healthier and who had higher socioeconomic status would engage in more physical activity.

Tsai (1998) evaluated the relationships between exercise and demographic characteristics and family and social role commitments among adults aged 30 to 59 in Taiwan. Only 34.7% of female participants and 35.8% of male participants engaged in regular exercise. No significant differences for exercise were found between men and women. Tsai reported that people who had a higher educational level would engage in more exercise behaviors than those who had a lower educational level. In addition to demographic characteristics, family and social role commitments were associated with exercise behavior. Women who were mothers or daughters-in-law or who had jobs
performed less exercise. Men who were fathers or who had jobs also tended to practice fewer exercise behaviors.

In another investigation (Wang, 1998) of exercise behavior of women aged 40 to 60 in Taipei City, results consistently show that role commitments were the obstacles to exercise behavior for married women. The role commitments the women mentioned included childcare responsibilities, household responsibilities, and earning money to support the family. This study also found that these women’s perceptions of exercise could be barriers to exercise. They reported perceptions that exercise wasted energy and that exercise was a competitive activity and therefore not appropriate for females. Competitive activities were perceived to be male activities. This study also reported that these women failed to consider gardening, walking, or housekeeping as physical activities. This implies that to accurately measure physical activity and exercise among women and ethnic groups, studies are needed that are culturally relevant and that integrate family and life experiences (Ainsworth, Irwin, Addy, Whitt, & Stolarczyk, 1999).

The abovementioned studies, however, revealed that demographics (e.g., educational level, income, gender, family and social role commitments, and perceived health status) and perceptions of physical activity contribute to an understanding of the correlates of physical activity in Taiwan.

Characteristics of Family Caregivers in Taiwan

In Chinese society, the decision to seek mental health care is not made by the individual alone but usually includes his or her family, because the Chinese are a collective people who rely on their families when they make important decisions (Chien,
Thus, family caregivers play a crucial role in the provision of care for the mentally ill. Given the possible connections between demographic factors and physical activity, there is a need to gather caregivers’ demographic data in order to accurately explore the physical activity behavior of family caregivers of mentally ill patients.

The demographic characteristics of family caregivers of mentally ill patients have been addressed by researchers in Taiwan and have been a concern of psychiatrists and other health care professionals involved in the inpatient and outpatient management of mental illness (Hu et al., 1994; Tung, 1998). Hu et al. (1994) surveyed 10,360 subjects to explore the sociodemographic characteristics of family caregivers of psychiatric inpatients in Taiwan. Results showed that more than 75% of the caregivers had an education level lower than senior high school. Most often, caregivers (33.1%) were the patients’ parents, and the average age of these parents was over 60 years old. The researchers concluded that the quality of care for mental illness could be problematic due to the low education level and advanced age of the chief caregivers.

Tung (1998) studied the relationships between the demographic characteristics of family caregivers and satisfaction with home care for mentally ill patients in Taipei City. Seventy-five family caregivers participated in the study. Tung reported that the majority of the family caregivers (68.0%) were over 50 years old and that more than half (56.0%) were the patients’ parents. Approximately 63.7% of the caregivers had less than a senior high school education; only 13.3% had more than a senior high school education. Moreover, about two thirds (69.3%) of the family caregivers reported that their average monthly incomes were less than NT $20,001 (U.S. $625) when the national monthly
income average was about NT $28,584 (U.S. $893).

Data from Hu et al. (1994) and Tung (1998) suggest that most family caregivers were elderly parents with less than a senior high school education and below average incomes. Such demographic characteristics could negatively affect physical activity.

The TTM and Physical Activity and Exercise

Development of the TTM has its roots in the areas of therapy evaluation and smoking cessation. Currently, evidence has shown promise for the TTM’s application to a number of health behaviors: smoking, safe sex, alcohol and drug dependence, diet and weight management, stress management, sun exposure, screen behaviors (e.g., mammography and cervical cancer), medication compliance, physical activity and exercise, and a variety of other behaviors. The TTM consists of five stages of change, as well as self-efficacy, decisional balance, and 10 processes of change. The TTM was an attempt to integrate these different constructs into a single comprehensive framework, hence the name “trantheoretical.” The appeal of the TTM is that rather than conceptualizing behavioral action and inaction as a dichotomy; they are conceptualized as a process of movement through a sequence of five stages (Prochaska et al., 2002).

What follows is a general description of the constructs from the TTM as they are applied to regular physical activity. Literature applying the TTM to physical activity and exercise among adults from different countries, such as the USA, Australia, Canada, Mexico, China, and Japan, was also reviewed.
Description of the Constructs From the TTM

The stages of change. The TTM identifies five stages of change representing a temporal dimension, which allows the researcher to understand when a change in attitude toward a targeted behavior occurs. The TTM constructs change as a process that involves progression through a series of five stages: precontemplation, contemplation, preparation, action, and maintenance (Prochaska et al., 2002). The stages identified for regular physical activity are as follows: (a) precontemplation (individuals who are not engaged in regular physical activity and do not intend to start in the next 6 months), (b) contemplation (individuals who are not engaged in regular physical activity but intend to start in the next 6 months), (c) preparation (individuals who are not engaged in regular physical activity but intend to take action in the next 30 days), (d) action (individuals who currently have been engaged in regular physical activity for less than 6 months), and (e) maintenance (individuals who currently have been engaged in regular physical activity for more than 6 months). The time descriptors used for physical activity were adapted from the studies on smoking rather than on physical activity. Six months seem to roughly correspond to physical activity beyond a season (e.g., summer activities or sports seasons) (Burbank & Riebe, 2002). Yet the validity of these time delineations has not been tested. Consequently, the question remains whether the time frames used are the optimal ones for physical activity stages.

Self-efficacy. Self-efficacy is the degree of confidence an individual has in his or her ability to be physically active on a regular basis under a number of circumstances (Bandura, 1997). Self-efficacy is positively associated with physical activity behavior according to the TTM. Self-efficacy in physical activity behaviors has been shown to
increase from precontemplation to maintenance in different adult populations. The increase of self-efficacy across stages does not seem to depend upon the scale used or the population studied.

**Decisional balance.** Decisional balance is the individual’s evaluation of the pros (benefits) and cons (barriers) of regular physical activity (Prochaska et al., 2002). According to the TTM, the individual’s evaluation of benefits and barriers related to physical activity behavior is differentially associated with stages of change. Generally, most studies have found that pros increase and cons decrease across the stages of change, regardless of populations studied and measures used.

**The processes of change.** The processes of change are the strategies and techniques people use to change a problem behavior (Prochaska et al., 2002). The 10 processes of change include five cognitive processes (i.e., consciousness raising, dramatic relief, environmental reevaluation, self reevaluation, and social liberation) and five behavioral processes (i.e., stimulus control, helping relationship, counterconditioning, reinforcement, and self-liberation). People at different stages of change are hypothesized to use distinct cognitive and behavioral processes of change. Studies report that individuals who are in earlier stages use more cognitive processes as strategies to move to later stages. Individuals who are in later stages use more behavioral processes as strategies to prevent relapse to earlier stages. However, these processes of change were not included in this study.

**The Application of the TTM in the West**

Marcus, Rakowski, and Rossi (1992), in a cross-sectional study, examined the relationships between stages of change and decisional balance (pros and cons) for
exercise behavior among 778 U.S employees from four worksites. Results showed that pros scores were significantly higher for subjects in maintenance as compared to precontemplation and contemplation; in action as compared to precontemplation, contemplation, and preparation; and in preparation and contemplation as compared to precontemplation. Additionally, cons scores were significantly lower for subjects in maintenance as compared to action and precontemplation; in action and maintenance as compared to preparation; and in all stages as compared to contemplation.

Another U.S. survey by Marcus, Rossi, et al. (1992) investigated the prevalence of the stages of change for exercise and their relationships to demographic variables in a cross-sectional study. A sample of 1172 employees was recruited from a worksite health promotion project. Researchers found that 24.4% of subjects were in precontemplation, 33.4% in contemplation, 9.5% in preparation, 10.6% in action, and 22% in maintenance. Results also demonstrated that females were more likely than males to be in the contemplation and action stages and less likely to be in the maintenance stage. Moreover, subjects who were older, who were less educated, and who had greater BMI (kg/m²) scores tended to be in the earlier stages. Stage of change was not related to total family income.

In another U.S. worksite study, which examined the differences in decisional balance and self-efficacy scores across the five stages of change for exercise, 393 employees in a municipal government worksite in Arizona were recruited for a cross-sectional study (Herrick et al., 1997). The study found that 3.3% of subjects were in the precontemplation stage, 10.3% in contemplation, 35.5% in preparation, 8.7% in action, and 42.2% in maintenance. Self-efficacy and pros scores were found to be significantly
higher in the action and maintenance stages as compared to the precontemplation and contemplation stages. In contrast, cons scores were significantly lower in the action and maintenance stages as compared to the precontemplation and contemplation stages.

Boyle et al. (1998) conducted a cross-sectional study to assess the stages of change for physical activity, diet, and smoking among HMO members with chronic conditions (i.e., overweight, hypertension, diabetes, dyslipidemia, and heart disease). The study sample included 6152 subjects aged 40 or over enrolled in an HMO in Minnesota. Results revealed that 45.1% of the sample were in the maintenance stage, and 15.5% were in action, 11.7% in preparation, 13.1% in contemplation, and 14.7% in precontemplation. Stages of change were related to age, gender, and education. However, little information was available about how age, gender, and education affect stages of change.

A comparative study by Marcus and Owen (1992) explored the prevalence of the stages of change for exercise and their relationships to self-efficacy and to decisional balance in a sample of 1093 U.S. employees and 801 Australian employees. In the U.S. sample, 8.0% of employees were found to be in the precontemplation stage, 30.8% in contemplation, 28.8% in preparation, 13.2% in action, and 19.2% in maintenance. In the Australian sample, employees in the precontemplation stage constituted 7.2% of the sample, 35.9% were in contemplation, 25.4% in preparation, 6.8% in action, and 24.7% in maintenance. Although the two samples were from different counties, these prevalence data were consistent. In both samples, there was not strong discrimination between all of stages of exercise change for self-efficacy, pros, and cons scores. However, subjects in the precontemplation stage scored the lowest and those in
maintenance scored the highest on the self-efficacy and pros, with the pattern reversed for the cons. In addition, younger subjects were significantly more active than older subjects. More educated subjects were significantly more active than less educated subjects. There were no significant findings in regard to gender in either sample.

An Australian study by Gorely and Gordon (1995), a cross-sectional study of 583 Australian adults aged 50-65, examined the application of the TTM to exercise behavior. The researchers found that 14.6% of subjects were in the precontemplation stage, 9.6% in contemplation, 29% in preparation, 9.4% in action, and 37.4% in maintenance. Self-efficacy scores showed a significant increase from the precontemplation stage to the maintenance stage. Pros scores were significantly higher for those in the maintenance stage than for those in the precontemplation stage, and cons scores were significantly lower for those in the maintenance stage than for those in the precontemplation stage. Furthermore, age, gender, income, disease history, and employment status (e.g., part time or full time) were not significantly associated with stages of change.

Booth et al. (1993) also used the TTM to study physical activity among 4404 Australian adults. Relationships between stages of change and sociodemographic variables were assessed. Results indicated that 38.2% were in the maintenance stage, 23.3% in action, 16.2% in preparation, 9.6% in contemplation, and 12.7% in precontemplation. Respondents who were older or less educated were more likely to be in later stages. No significant relationships between gender and stages of change were revealed.

In a cross-sectional study by Laffrey (2000), relationships among stages of change for physical activity, self-efficacy, and age were examined among Mexican American
women. The sample consisted of 71 community-residing Mexican American women aged 60-87. Of those subjects, 12.9% were in precontemplation, 14.3% in contemplation, and 24.3% in each of the remaining stages: preparation, action, and maintenance. Those who were in the precontemplation stage scored significantly lower in self-efficacy than those in each of the other four groups. The contemplation, preparation, action, and maintenance groups did not differ significantly from each other in their self-efficacy. Moreover, age was not significantly related to stages of change and self-efficacy.

Gonzalez and Jirovec (2001) also used a cross-sectional study of Mexican women 60 years old and older to test stages of change, as well as to explore the relationships between stages of change and role commitments. Fifty older women were randomly selected from two separated low socioeconomic neighborhoods. The proportion of women in the different stages of change was as follows: 28% precontemplation nonbelievers, 26% precontemplation believers, 40% in contemplation, and 6% in maintenance. None were in the preparation or action stages. The results suggested that stages of change and role commitments were not significantly related.

In addition to the cross-sectional studies, observational data on patterns of exercise change and self-efficacy and decisional balance use have been explored longitudinally in a sample of Canadian adults (Plotnikoff et al., 2001). The scales were administrated at baseline (time 1), at 6 months (time 2), and at a 1-year follow-up (time 3). Six hundred eighty-three men and women with a mean age of 40.6 years, identified through random-digit telephone dialing, completed all measures across the three time points. The results revealed that self-efficacy was significantly higher for those progressing out of the precontemplation stage (time 2-3), the contemplation stage (time
1-2, time 2-3), and the preparation stage (time 2-3) and higher for the remainers over the regressors for those in the action and maintenance stages (time 1-2, time 2-3). The researchers also found that pros were significantly higher for those who remained in the action and maintenance stages (time 2-3) than for those who regressed. Lower cons scores were significant predictors only for those remaining in the action and maintenance stages (time 2-3) and for the forward transition from preparation (time 2-3). In general, pros scores were significantly higher for those individuals in action and maintenance than for those in precontemplation, while cons scores were significantly lower for those in action and maintenance than for those in precontemplation. The authors concluded that the results concerning self-efficacy and decisional balance were consistent with the TTM.

Overall, the relative consistency of findings from both cross-sectional and longitudinal studies support the applicability of the TTM to diverse adult populations. However, across a number of demographic factors, no consistent correlates of the constructs from the TTM were found.

The Application of the TTM in the East

Although the TTM has been widely applied to physical activity and exercise in the West, there are only two recent published studies applying the TTM to exercise behaviors in the East, specifically among young Chinese (Callaghan et al., 2002) and Japanese (Wakui et al., 2002) individuals.

A cross-sectional design was used by Callaghan et al. (2002) to test the application of the TTM in relation to the regular exercise behavior of 298 Hong Kong Chinese undergraduates, with a mean age of 20 years. In this study, the definition of regular exercise (three or more sessions of exercise per week of at least 25 minutes’
duration) was nonspecific with no examples given or intensity specified. The researchers found that 4.3% of these Chinese undergraduate students were in precontemplation, 13.8% in contemplation, 44.3% in preparation, 26.3% in action, and 11.2% in maintenance. Self-efficacy and pros significantly increased from the precontemplation stage to the maintenance stage, although clear significant discrimination between all of stages was not revealed. However, there was no significant difference in cons across the five stages of change. This contradicts the prediction of the TTM that there will be difference in cons across the five stages. Callaghan et al. (2002) concluded that the unexpected findings related to cons could be the results of the differences in age and culture in the samples.

Similar results in the assessment of the TTM were reported by Wakui and colleagues (2002). To determine the applicability of the TTM in Japan, Wakui et al. (2002) conducted a cross-sectional study that applied the TTM to exercise behavior of 450 female Japanese university students, with a mean age of 18.4 years. Subjects involved in this study placed in the five stages as follows: 24.7% in precontemplation, 26.7% in contemplation, 39.3% in preparation, 3.8% in action, and 5.6% in maintenance. Self-efficacy and pros were significantly increased from precontemplation to maintenance, although a clear significant differentiation between all stages was not observed. No significant differences in cons across the five stages of change were found. This result accords with the Chinese literature by Callaghan et al. (2002). The researchers suggested that there was a need to use a multidimensional scale to clarify the relationships between stages of change and perceived barriers. Additionally, subjects in the maintenance stage showed a significantly higher BMI (kg/m²) than those in the
precontemplation and contemplation stages. Researchers believed this may be due to increased muscle mass in highly active subjects. Furthermore, subjects in the maintenance stage reported significantly longer exercise times than those in the precontemplation and contemplation stages.

The TTM postulates that cons will decrease with advancing stages. However, given that the Eastern studies by Callaghan et al. (2002) and Wakui et al. (2002) found no differences in cons across stages, the predictions of the TTM are only partially confirmed. Nevertheless, in both studies, the definition of exercise was nonspecific, with no examples given and no criteria for frequency, intensity, or duration. Therefore, the stage distribution findings and related results might be biased.

Conceptual Framework

The TTM was used as a framework for this study in order to examine its capability to assess physical activity among family caregivers of patients with mental illness in Taiwan. Only three of the four theory constructs were used in this study: self-efficacy, decisional balance, and stages of change. The relationships among self-efficacy, decisional balance, and stages of change are depicted in Figure 1. In this framework, self-efficacy and decisional balance (perceived benefits and barriers) are expected to have a direct effect on stages of change. As posited by the TTM, therefore, the interrelations of these constructs in regards to physical activity among family caregivers were (a) caregivers who are in later stages of the TTM (e.g., action or maintenance) will show a significantly higher level of self-efficacy relative to regular physical activity than those in earlier stages (e.g., precontemplation or contemplation); (b) caregivers who are in later stages of the TTM will perceive significantly more
**CAREGIVERS’ DEMOGRAPHICS**

1. Biological Factors
2. Sociocultural Factors
3. Psychological Factors
4. Prior Physical Activity Behavior

**DECISIONAL BALANCE**

1. Benefits of Regular Physical Activity
2. Barriers to Regular Physical Activity

**SELF-EFFICACY FOR REGULAR PHYSICAL ACTIVITY**

**STAGES OF CHANGE**

1. Precontemplation
2. Contemplation
3. Preparation
4. Action
5. Maintenance

*Figure 1.* The transtheoretical model for regular physical activity.
benefits of regular physical activity than those in earlier stages; (c) caregivers who are in later stages of the TTM will perceive significantly fewer barriers to regular physical activity than those in earlier stages.

The aforementioned literature has supported an association of demographics with physical activity and the TTM. Thus, the relationships between demographic variables and constructs from the TTM were explored in this study. Conceptual and operational definitions for each variable are presented below.

**Family Caregivers’ Demographic Characteristics**

In this study, the family caregiver was determined by one factor: the family member who reported spending the most time taking care of the patient at home. In previous studies, the constructs from the TTM and physical activity were associated with several family caregivers’ demographic factors: (a) biological factors such as age, gender, BMI (kg/m²), and disease history; (b) sociocultural factors such as relationship to patient, educational level, monthly income, working hours outside the home, the amount of time spent in caregiving, and the amount of support caregivers received from other family members for caregiving; (c) psychological factors such as perceived health status and perception of physical activity; and (d) prior physical activity behavior such as the amount of time spent in moderate or vigorous physical activity over the past 2 weeks. Other sociocultural aspects, such as caregivers’ religion and marital status, were also assessed. These factors were measured using the Family Caregiver’s Demographic Characteristic Questionnaire (see Appendix A), created by me.
Family Caregivers’ Stages for Regular Physical Activity

The five TTM stages of change are (a) precontemplation, (b) contemplation, (c) preparation, (d) action, and (e) maintenance. The stages identified for regular physical activity were as follows:

1. Precontemplation: the person is not engaged in regular physical activity and has no intention to change in the next 6 months.

2. Contemplation: the person is not engaged in regular physical activity but has formed an intention to change in the next 6 months.

3. Preparation: the person is not engaged in regular physical activity but intends to take action in the next 30 days.

4. Action: the person currently engages in regular physical activity and has done so for less than 6 months.

5. Maintenance: the person currently engages in regular physical activity and has been doing so for more than 6 months.

One question from the Stages of Change for Regular Physical Activity Questionnaire (Cancer Prevention Research Center, 2002) (see Appendix B) was used to determine caregivers’ stage of regular physical activity. There is one item (i.e., Do you engage in physical activity regularly?) with five statements representing each stage. Family caregivers were asked to check the statement that applied to their current status for regular physical activity.

Clearly defined criteria for regular physical activity were needed in order to obtain accurate results for stage distribution. In the Chinese language, physical activity can be translated literally into two parts. The word “physical” means “of the body,” and
“activity” means “to live and to move.” Together, these terms can be interpreted literally as to live and to move your body. Therefore, Chinese people usually perceive physical activity as “If you want to live, you need to pursue an active life and to participate in active body movements.” A definition from the United States proposes that physical activity is bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above the basal level (Bouthard & Shephard, 1994). In this study, regular physical activity was defined as any planned/routine/daily physical activity performed to increase physical fitness, including different types of activities such as exercise, occupational work and chores, and leisure-time physical activity. The operationalization of the regular physical activity was described as “accumulate at least 30 minutes of moderate physical activity for more than 5 days of the week, or engage in vigorous activity lasting at least 20 minutes for at least 3 days a week,” which is recommended by the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) (Pate et al., 1995). It is not necessary to perform activity in one session. Several 8-10 minute sessions can be just as effective. In addition, such recommended activities should increase individuals’ breathing rate, cause individuals to break a sweat, and reach 40% to 60% of his/her maximum heart rate. Vigorous activity is defined as more than 6 metabolic equivalents (METs), and moderate activity is between 3 and 6 METs (Ainsworth et al., 2000). MET is a unit used to estimate the metabolic cost of physical activity. MET values are assigned to moderate or vigorous activities based on energy cost values. One MET equals the energy expenditure at rest. A 3-MET activity thus represents an activity that requires three times the resting metabolic rate.
Moreover, in order to accurately measure stages of regular physical activity among Taiwanese family caregivers, the Examples of Vigorous and Moderate Activities instrument (see Appendix C) was provided to family caregivers to help them identify vigorous or moderate activities they engaged in. These examples were selected by me, a physical education instructor, a physician, and from the Compendium (Ainsworth et al., 2000) and represent various kinds of vigorous and moderate activities. The examples chosen were the most common vigorous or moderate activities in Taiwan (e.g., tai-chi, slow cycling, house cleaning, and walking).

Since the recommendation from the CDC and ACSM was the same as the suggestion issued by the Department of Health in Taiwan (2002), the use of that definition for regular physical activity would not cause confusion among family caregivers during the collection of data for the study.

Self-Efficacy for Regular Physical Activity

In this study, self-efficacy was defined as the family caregiver’s perceived ability to practice regular physical activity under a number of situations (Bandura, 1997). Self-efficacy relative to regular physical activity was measured by 18 questions from the Exercise Self-Efficacy Scale (Bandura, 2001) (see Appendix D). The family caregivers were asked to rate how confident they are that they can perform physical activity regularly on a scale of 0 to 100 under given circumstances, such as during bad weather and feeling tired.
Family Caregivers’ Decisional Balance

Decisional balance reflects the family caregiver’s relative weighting of the perceived benefits and barriers of regular physical activity (Prochaska et al., 2002). Family caregivers’ perceived benefits of regular physical activity were assessed by 29 questions from the Exercise Benefits Scale (Sechrist, Walker, & Pender, 1987) (see Appendix E). Fourteen items from the Exercise Barriers Scale (Sechrist et al., 1987) (see Appendix F) were used to evaluate caregivers’ perceived barriers to regular physical activity. Using a 4-point Likert scale, family caregivers reported their degree of perceived benefits and barriers. In both scales, exercise was a subcategory of physical activity and was defined for this study as performing regular physical activity to improve fitness and health.
CHAPTER 3

METHOD

Design

A descriptive, correlational, and cross-sectional design was used for this study. The data were used to (a) determine whether constructs from the TTM are applicable to Taiwanese family caregivers relative to regular physical activity and (b) explore the factors that affect constructs from the TTM (e.g., stages of change, self-efficacy, perceived benefits, and perceived barriers). A questionnaire was used to obtain data from primary family caregivers who were caring for mentally ill patients currently receiving home care. Participants were asked to complete five self-administered instruments.

Setting and Sampling

The setting for this research was the individual subject’s home. The subjects were the primary family caregivers of mentally ill patients currently receiving home care from a psychiatric hospital in Tainan, Taiwan. This hospital has been providing home care for mental illness since 1998. There were three full-time nurses, one full-time social worker, and one full-time psychiatrist serving in the home care program. This hospital was chosen because the home care program provided by this hospital has the largest number of potentially eligible caregivers in the southern Taiwan area (N = 120-150). In addition,
this home care program employed a professional staff almost identical to that of other hospitals' home care programs.

The sample consisted of 113 primary family caregivers caring for a mentally ill family member who was currently receiving home care. The primary family caregiver was the family member who reported spending the most time taking care of the patient at home. Additional sampling criteria included (a) willingness to participate in the study, (b) ability to communicate in Chinese or Taiwanese, (c) living in Tainan or Kaohsiung, (d) no restrictions on physical activity, and (e) no mental health problems or other debilitating diseases. Pregnant women were also excluded because they typically decrease their physical activity in Taiwanese culture.

Procedure

Before undertaking the proposed study, I sought approval from the Institutional Review Board (IRB) at the University of Utah and from the selected psychiatric hospital in Tainan. At the same time, the translated instruments had been developed. The development of the translated instruments is explained in greater detail in the instruments section. In order to protect the rights of the participants of this study, each primary family caregiver was asked to sign an informed consent form (see Appendix G). Additionally, all of the instruments were assigned a code to ensure the confidentiality of respondents. For security, the coded list and all the collected data were stored in separated locked boxes.

After permission for the study was obtained from the University of Utah IRB and from the selected psychiatric hospital in Tainan, I carried out a pilot study of the translated instruments at the local public health center in Tainan City. Five family
caregivers of mentally ill patients currently under the care of the public health center home care program were selected randomly. The purposes of the pilot study were to (a) assess the suitability of the translated questionnaire and to detect any weakness in the questions and (b) enhance my familiarity with the use of the translated questionnaire. The translated instruments were adjusted based on the responses from the pilot study.

Next, a complete list of potential participants’ names and telephone numbers was provided for me by the selected psychiatric hospital in Tainan. The release of a participant’s information is legal under every jurisdiction of Taiwan as long as the hospital has approved the research study. Then the potential caregivers were contacted by telephone, given a brief introduction to the study, and asked to participate. Once the caregiver agreed to participate in this study, I arranged an appointment time and accompanied the visiting nurse to meet each caregiver in the caregiver’s home. The consent form and the questionnaire were completed at that time while the visiting nurse cared for the patient. In order to help caregivers provide correct information for this study, I further explained the definition of exercise and physical activity and provided examples of moderate and vigorous activities to caregivers during data collection. If the participants could not complete the self-administered questionnaire, I read the questions to them and completed the questionnaire according to the responses of each participant. Time to complete the questionnaire was 15 to 30 minutes.

Instruments

The questionnaire consisted of five self-administrated instruments that took 15 to 30 minutes to complete in the subject’s home. The instruments for this study were (a) Family Caregiver’s Demographic Characteristic Questionnaire (see Appendix A), (b)
Stages of Change for Regular Physical Activity Questionnaire (see Appendix B), Exercise Self-Efficacy Scale (see Appendix D), Exercise Benefits Scale (see Appendix E), and Exercise Barriers Scale (see Appendix F). A description of each instrument and translation methodology follows.

Family Caregiver’s Demographic Characteristic Questionnaire

To elicit family caregivers’ demographic information, I designed the Family Caregiver’s Demographic Characteristic Questionnaire (see Appendix A), which contains 16 questions. This instrument was used to assess the caregiver’s demographic variables. These variables included (a) caregivers’ biological characteristics, such as age, gender, BMI (kg/m²), and disease history; (b) caregivers’ sociocultural characteristics, such as relationship to patient, education level, religion, marital status, monthly income, working hours outside the home, amount of time spent in caregiving, and amount of support caregivers received from other family members for caregiving; (c) caregivers’ psychological characteristics, such as perceived health status and perception of physical activity; and (d) prior physical activity behavior, such as amount of time spent in moderate or vigorous physical activity over the past 2 weeks.

Stages of Change for Regular Physical Activity Questionnaire

This instrument, adapted from the smoking literature (Prochaska & DiClemente, 1983), was developed as a general survey of health behaviors (Cancer Prevention Research Center, 2002). It consists of one item (i.e., Do you engage in physical activity regularly?), with five statements representing each stage (see Appendix B). Family caregivers were asked to mark the one statement that applied to their current status for
regular physical activity. Stage-defining answer categories are (a) precontemplation (No, and I do not intend to start in the next 6 months); (b) contemplation (No, but I intend to start in the next 6 months); (c) preparation (No, but I intend to start in the next 30 days); (d) action (Yes, for less than 6 months); and (e) maintenance (Yes, for more than 6 months).

Regular physical activity was defined as any planned/routine/daily physical activity performed to increase physical fitness, including exercise, occupational work and chores, and leisure-time physical activity. Such activity should account for at least 30 minutes of moderate physical activity for more than 5 days of the week, or at least 20 minutes of vigorous physical activity for 3 or more days a week (Pate et al., 1995). The Examples of Vigorous and Moderate Activities (see Appendix C) were provided to caregivers to help them identify moderate or vigorous activities they engaged in.

**Exercise Self-Efficacy Scale**

The Exercise Self-Efficacy Scale was constructed by Bandura (2001) (see Appendix D). For this study, it measures the strength of caregivers' belief in their ability to execute regular physical activity under various circumstances. It consists of a set of 18 items regarding different situations. Responses are on a 100-point scale in 10-unit intervals ranging from 0 (cannot do at all) through intermediate degrees of assurance such as 50 (moderately certain can do) to complete assurance, 100 (certainly can do). The subjects were asked to rate their confidence from 0 to 100 for various circumstances listed. The higher the score, the more confidence the individual has to engage in regular physical activity.
Based on the responses of 249 Korean adults with chronic diseases, Shin, Jang, and Pender (2001) reported reliability data, item analysis, and factor analysis for the Korean version of the Exercise Self-Efficacy Scale. Cronbach’s alpha was .94. Two-week test-retest reliability was .77. The item-total correlation of all items was between .57 and .72. Factor analysis is one way to assess construct validity of the scale (Waltz, Strickland, & Lenz, 1991). Through factor analysis without rotation, the Exercise Self-Efficacy Scale identified one factor accounting for 77.5% of the variance. Through factor analysis with rotation, three factors were extracted with an explained variance of 96.4%. The three factors were situational/interpersonal factor, competing demands factor, and internal feelings factors.

Exercise Benefits/Barriers Scale

The Exercise Benefits/Barriers Scale (Sechrist et al., 1987) was developed to measure the perceptions of individuals concerning the benefits of and barriers to participating in exercise. This 43-item instrument consists of a 29-item benefits scale and a 14-item barriers scale. The instrument may be scored and used in its entirety or as two separate scales. In this study, the benefits and barriers scales were used and scored separately.

The Exercise Benefits Scale (see Appendix E) contains 29 items with a 4-point force choice Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree). For this study, this instrument was intended to evaluate the level of family caregivers’ perceptions of the benefits of regular physical activity. The higher the score, the more positively the caregiver perceives the benefits of regular physical activity.
The Exercise Barriers Scale (see Appendix F) contains 14 items with a 4-point force choice Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree). For this study, this scale was used to measure the level of caregivers' perceptions of barriers to regular physical activity. The higher the score, the more the caregiver perceives barriers to regular physical activity.

Initial psychometric evaluation of the Exercise Benefits/Barriers Scale was based on the responses of 650 adults from northern Illinois, including reliability measure and factors analysis (Sechrist et al., 1987). The 29-item Benefits Scale has a standardized Cronbach’s alpha of .95. The 14-item Barriers Scale has a Cronbach’s coefficient alpha of .87. Validity for the Exercise Benefits/Barriers Scale was determined by factor analysis. A factor analysis of the 47 items yielded a nine-factor solution initially, explaining 64.9% of the variance. Five of the factors were perceived benefits, and the remaining four were perceived barriers. The nine factors were life enhancement, physical performance, psychological outlook, exercise milieu, social interaction, time expenditure, preventive health, physical exertion, and family encouragement. Second-order factor analysis yielded a two-factor solution, one a benefits factor and the other a barriers factor, with 47.4% of the variance explained. The test-retest reliability was accomplished with a sample of 66 healthy adults at a 2-week interval. Test-retest reliability was found to be .89 on the Exercise Benefits Scale and .77 on the Exercise Barriers Scale.

Translation Methodology

When this study began, there were no existing Chinese versions of the Stages of Change for Regular Physical Activity Questionnaire, Exercise Self-Efficacy Scale, Exercise Benefits Scale, or Exercise Barriers Scale. These instruments were translated
into Chinese using a two-part method: (a) translation by a committee and (b) back-translation. A committee produced Chinese versions of these instruments for this study. Committee members were bilingual Taiwanese, fluent in both Chinese and English; they included me, a physical education instructor, and a physician. The committee produced a consensus Chinese version for each instrument. Then the documents were translated back into English. Back-translation ensures that both versions of the instruments convey the same meaning (Varricchio, 1997). The back-translator for the instruments used in this study was a bicultural as well as bilingual student. He was raised in a Chinese American family and community and spoke Chinese at home while studying at a U.S. school. He was fluent in reading, speaking, and writing both English and Chinese.

After the original translation and the back-translation process were completed, a panel of three professional nursing experts from Taiwan in the areas of instrument development, health behavior, and caregivers were asked to review the clarity and linguistic appropriateness of the Chinese version. The instruments were modified based on the comments from the experts. Next, the translated instruments were pilot-tested with 8 Taiwanese students at the University of Utah prior to submitting the application to the IRB at the University of Utah. Again, revisions were made based on the suggestions of the Taiwanese students.

Following approval from the university and the psychiatric hospital in Tainan, the instruments were again pilot-tested within a sample of five family caregivers of mentally ill patients currently under the care of the public health center home care program in Tainan. As a result of the family caregiver pilot study, minor changes to nine questions from the self-efficacy, benefits, and barriers instruments were made in response to
caregivers' educational levels and their feedback (see Appendix H). However, the original intent of the questions remained intact.

Data Analysis

The research hypotheses, questions, and the type of data directed the data analysis in this study. Data were analyzed using SPSS (Statistical Package for the Social Science) version 11.0 for Windows. Reliability analysis was used to measure the internal consistency of the instruments. For all analyses in this research, a level of \( p < .05 \) was employed to determine statistical significance. The following is a description of the data analysis for each research hypothesis and question.

Hypothesis (1A)

Caregivers who are in later stages of the TTM (e.g., action or maintenance) will show a significantly higher level of self-efficacy relative to regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Analysis (1A)

In order to assess the caregivers' stages of the TTM relative to regular physical activity, one item from the Stages of Change for Regular Physical Activity Questionnaire was used. The data collected from this instrument were used to test research hypotheses 1A, 1B, and 1C and research question 2A. The percentage and frequency distribution were used to determine the distribution of caregivers among the stages of regular physical activity.

Next, mean and standard deviation were used to descriptively analyze the family caregivers' self-efficacy data from the Exercise Self-Efficacy Scale. The average of all
18 items from the Exercise Self-Efficacy Scale was calculated to indicate overall self-efficacy. This information was used for research hypothesis 1A and research questions 2B-1 and 2B-2.

One-way analysis of variance (ANOVA) was used to compare the means of two or more groups. Therefore, a one-way ANOVA was performed to examine the differences in the level of overall self-efficacy among stage groups. The independent variable was the stage group. The dependent variable was overall self-efficacy. After ANOVA had produced a significant result, a post hoc Sheffe test was applied to determine which specific pairs of means differed significantly from one another.

Hypothesis (1B)

Caregivers who are in later stages of the TTM (e.g., action or maintenance) will perceive significantly more benefits of regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Analysis (1B)

Mean and standard deviation were used to descriptively examine the data from the Exercise Benefits Scale about caregivers’ perceptions of the benefits of regular physical activity. The average score across all 29 items from the Exercise Benefits Scale was estimated to show an overall perception of the benefits of regular physical activity. The data were used to assess research hypothesis 1B and research questions 2C-1 and 2C-2. Next, the differences in the level of overall perception of benefits among stage groups were examined using a one-way ANOVA. The independent variable was the stage group. The dependent variable was caregivers’ overall perception of the benefits of
regular physical activity. Again, when a significant difference was found, a post hoc Scheffe test was carried out to find out which specific pairs of means differed significantly from one another.

Hypothesis (1C)

Caregivers who are in later stages of the TTM (e.g., action or maintenance) will perceive significantly fewer barriers to regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Analysis (1C)

I used mean and standard deviation to descriptively assess the data from the Exercise Barriers Scale about family caregivers’ perceptions of the barriers to regular physical activity. The average of all 14 items on the Exercise Barriers Scale was computed to indicate an overall perception of the barriers to regular physical activity. The data were used to analyze research hypothesis 1C and research questions 2D-1 and 2D-2. A one-way ANOVA was then performed to examine the differences in the level of overall perception of barriers among stage groups. The independent variable was the stage group. The dependent variable was caregivers’ overall perception of the barriers to regular physical activity. Once more, after ANOVA had produced a significant result, a post hoc was conducted using the Scheffe procedure to clarify which specific pairs of means differed significantly from one another.

Question (2A)

What is the relationship between caregivers’ stages in the TTM and caregivers’ demographics (i.e., age, BMI (kg/m²), the amount of time spent in caregiving, working
hours, gender, relationship to patient, religion, marital status, educational level, monthly income, the amount of support caregivers received from other family members for caregiving, disease history, health perception, perception of physical activity, and hours of physical activity for the past 2 weeks)?

**Analysis (2A)**

Percentage, frequency distribution, mean, and standard deviation were used to descriptively analyze the data from the Family Caregiver's Demographic Characteristic Questionnaire. The data were used to analyze research questions 2A, 2B-1, 2B-2, 2C-1, 2C-2, 2D-1, and 2D-2. A chi-square test was used for categorical data, such as the assessment of associations between caregivers' stages in the TTM and caregivers' gender, relationship to patient, marital status, religion, disease history, and perception of physical activity. Spearman's rho analysis was used to test the relationship between two ordinal variables or an ordinal and an interval variable, such as the relationships between caregivers' stages in the TTM and caregivers' age, BMI (kg/m²), educational level, income, working hours, perceived health, the amount of time spent in caregiving, the amount of support caregivers received from other family members for caregiving, and hours of physical activity for the past 2 weeks.

**Question (2B-1)**

What is the relationship between the level of self-efficacy relative to regular physical activity and caregivers' demographics?
Analysis (2B-1)

The relationships between caregivers’ overall self-efficacy and caregivers’ demographics were analyzed using either Spearman’s rho analysis for two ordinal variables or an ordinal and an interval variable, or Pearson correlation analysis for two variables at least interval level. In this study, Spearman’s rho was used to evaluate the relationships between the level of caregivers’ overall self-efficacy and caregivers’ educational level, income, perceived health status, and the amount of support caregivers received from other family members for caregiving. Pearson correlation analysis was used to assess the relationships between the level of caregivers’ overall self-efficacy and caregivers’ age, BMI (kg/m²), working hours, the amount of time spent in caregiving, and hours of physical activity for the past 2 weeks.

Question (2B-2)

What is the difference in the level of self-efficacy relative to regular physical activity among demographic subgroups of caregivers?

Analysis (2B-2)

A one-way ANOVA was performed to assess significant differences in the level of caregivers’ overall self-efficacy among different demographic subgroups (i.e., relationship to patient, gender, religion, marital status, disease history, and perception of physical activity).

Question (2C-1)

What is the relationship between the level of perceived benefits of regular physical activity and caregivers’ demographics?
Analysis (2C-1)

I used Pearson correlation to evaluate the relationships between the level of caregivers’ overall perception of the benefits of regular physical activity and caregivers’ age, BMI (kg/m²), working hours, the amount of time spent in caregiving, and hours of physical activity for the past 2 weeks. Spearman’s rho analysis was employed to evaluate the relationships between the level of caregivers’ overall perception of benefits and caregivers’ educational level, income, perceived health, and the amount of support caregivers received from other family members for caregiving.

Question (2C-2)

What is the difference in the level of perceived benefits of regular physical activity among demographic subgroups of caregivers?

Analysis (2C-2)

A one-way ANOVA was carried out to examine significant differences in the level of caregivers’ overall perception of benefits among different demographic subgroups (i.e., perception of physical activity, relationship to patient, gender, religion, marital status, and disease history).

Question (2D-1)

What is the relationship between the level of perceived barriers to regular physical activity and caregivers’ demographics?
Analysis (2D-1)

Pearson correlation was applied to examine the relationships between the level of caregivers' overall perception of the barriers to regular physical activity and caregivers' age, BMI (kg/m^2), working hours, the amount of time spent in caregiving, and hours of physical activity for the past 2 weeks. Spearman's rho was performed to evaluate the relationships between the level of caregivers' overall perception of barriers and caregivers' educational level, income, perceived health, and the amount of support caregivers received from other family members for caregiving.

Question (2D-2)

What is the difference in the level of perceived barriers to regular physical activity among demographic subgroups of caregivers?

Analysis (2D-2)

Once more, a one-way ANOVA was used to assess significant differences in the level of caregivers' overall perception of barriers among different demographic subgroups (i.e., perception of physical activity, relationship to patient, gender, religion, marital status, and disease history).
CHAPTER 4

RESULTS

One hundred thirteen family caregivers met the eligibility criteria for the sample. Five of these did not complete the study. The reasons for people not completing the survey were that (a) 3 were unable to complete the questionnaire due to emotional stress and (b) 2 were excluded from the study because they were no longer providing care for a family member with a mental illness: one patient had committed suicide and the other was hospitalized at the time of the study. One hundred eight family caregivers agreed and completed the study. This represented 95.6% of the 113 potential participants. Data collection began on September 10, 2002, and ended on October 22, 2002, in Taiwan.

In this chapter, the reliability of the three instruments, the characteristics of the sample, and the stage distribution of caregivers’ physical activity for the study are described. This chapter also presents the results of data analysis for each research hypothesis and research question.

Reliability of the Instruments

The means, standard deviations, and Cronbach’s alpha reliability coefficients for the Exercise Self-Efficacy Scale, the Exercise Benefits Scale, and the Exercise Barriers Scale are shown in Table 1. There were no missing data for any of the instruments.
Table 1

The Means, Standard Deviations, and Cronbach’s Alpha for Exercise Self-Efficacy Scale, Exercise Benefits Scale, and Exercise Barriers Scale \((N = 108)\)

<table>
<thead>
<tr>
<th>Instruments</th>
<th>(M)</th>
<th>(SD)</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise Self-Efficacy Scale</td>
<td>52.68(^a)</td>
<td>30.97</td>
<td>.96</td>
</tr>
<tr>
<td>Exercise Benefits Scale</td>
<td>2.62(^b)</td>
<td>.77</td>
<td>.97</td>
</tr>
<tr>
<td>Exercise Barriers Scale</td>
<td>1.46(^b)</td>
<td>.52</td>
<td>.93</td>
</tr>
</tbody>
</table>

*Note.* \(^a\)Based on a 100-point scale in 10-unit intervals ranging from 0 (cannot do at all) through intermediate degrees of assurance such as 50 (moderately certain can do) to complete assurance, 100 (certainly can do). \(^b\)Based on a 4-point Likert scale ranging from 1 to 4 (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree).
Exercise Self-Efficacy Scale

Caregivers’ self-efficacy related to regular physical activity was assessed through the Exercise Self-Efficacy Scale. The responses of the 108 eligible family caregivers who completed the 18 items from the Exercise Self-Efficacy Scale were highly reliable, with a Cronbach’s alpha coefficient of .96, indicating a high degree of internal consistency.

Exercise Benefits Scale

The Exercise Benefits Scale consists of 29 items measuring caregivers’ perceived benefits of regular physical activity. This scale in the present study with 108 family caregivers had a Cronbach’s alpha of .97, indicating a high level of internal consistency.

Exercise Barriers Scale

Caregivers’ perceived barriers to regular physical activity were evaluated by the Exercise Barriers Scale. This 14-item measure was administrated to 108 caregivers. In this sample, the scale had a high internal consistency of .93, as measured by Cronbach’s alpha.

Description of Sample

Family Caregiver’s Demographic Characteristic Questionnaire was used to obtain information on (a) caregivers’ biological characteristics, such as age, gender, BMI (kg/m²), and disease history; (b) caregivers’ sociocultural characteristics, such as relationship to patient, religion, marital status, educational level, monthly income, working hours outside the home, amount of time spent in caregiving, and amount of support caregivers received from other family members for caregiving; (c) caregivers’
psychological characteristics, such as health perception and perception of physical activity; and (d) prior physical activity behavior. Several outliers from caregivers' demographic variables (e.g., hours of providing care daily and hours of physical activity for the past 2 weeks) were detected. Since these outliers represented actual values from the caregivers, I included them for data analysis.

The demographic characteristics of family caregivers are described below and summarized in Tables 2 and 3.

Caregivers' Biological Characteristics

One hundred eight family caregivers enrolled in the study. As seen in Table 2, caregivers were an average of 52.24 years old \( (SD = 15.41) \), with a range of 17 to 85 years. Caregivers ranged in BMI from 14.69 to 34.53 kg/m\(^2\) and had an average of 22.91 \( (SD = 3.48) \) that was within the normal range in Taiwan \( (18.50 \leq BMI (kg/m^2) < 24.00) \) (Department of Health of the Executive Yuan of Taiwan, 2002). Most caregivers \( (58.3\%) \) had a normal BMI (see Table 3). Approximately 33.3\% of the caregivers were overweight or obese according to the criterion defined by the Department of Health of the Executive Yuan of Taiwan (2002). The majority \( (56.5\%) \) of the caregivers were female, and 43.5\% were male. Data for caregivers' disease history were obtained through self-report. Over half \( (54.6\%) \) of the caregivers reported no disease of any kind, whereas 38\% thought that they had disease.

Caregivers' Sociocultural Characteristics

As shown in Table 3, 40.7\% of the family caregivers were parents' parents; 25\% were spouses; 17.6\% were children; and 16.7\% were other relatives. Three quarters
Table 2

The Ranges, Means, and Standard Deviations of Family Caregivers’ Characteristics
\((N = 108)\)

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>17-85</td>
<td>52.24</td>
<td>15.41</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>14.69-34.53</td>
<td>22.91</td>
<td>3.48</td>
</tr>
<tr>
<td>Weekly Working Hours</td>
<td>0-105</td>
<td>23.00</td>
<td>25.92</td>
</tr>
<tr>
<td>Daily Hours Caring for Patients</td>
<td>0-16</td>
<td>2.00</td>
<td>2.97</td>
</tr>
<tr>
<td>Hours of Physical Activity for the Past 2 Weeks</td>
<td>0-200</td>
<td>30.57</td>
<td>38.91</td>
</tr>
</tbody>
</table>
### Table 3

Number and Percentage of Family Caregivers' Characteristics \( (N = 108) \)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>No. of Caregivers</th>
<th>% of Caregivers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Body Mass Index (BMI) ( (\text{kg/m}^2) )</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 18.50</td>
<td>9</td>
<td>8.3</td>
</tr>
<tr>
<td>( 18.50 \leq \text{BMI} &lt; 24.00 )</td>
<td>63</td>
<td>58.3</td>
</tr>
<tr>
<td>More than 24.00</td>
<td>36</td>
<td>33.3</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>61</td>
<td>56.5</td>
</tr>
<tr>
<td>Male</td>
<td>47</td>
<td>43.5</td>
</tr>
<tr>
<td><strong>Disease History</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>41</td>
<td>38.0</td>
</tr>
<tr>
<td>No</td>
<td>59</td>
<td>54.6</td>
</tr>
<tr>
<td>I don’t know</td>
<td>8</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>Relationship to Patient</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse</td>
<td>27</td>
<td>25.0</td>
</tr>
<tr>
<td>Child</td>
<td>19</td>
<td>17.6</td>
</tr>
<tr>
<td>Parent</td>
<td>44</td>
<td>40.7</td>
</tr>
<tr>
<td>Other relatives</td>
<td>18</td>
<td>16.7</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>81</td>
<td>75.0</td>
</tr>
<tr>
<td>Single</td>
<td>14</td>
<td>13.0</td>
</tr>
<tr>
<td>Widowed</td>
<td>13</td>
<td>12.0</td>
</tr>
<tr>
<td><strong>Educational Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than senior high</td>
<td>70</td>
<td>64.8</td>
</tr>
<tr>
<td>Senior high</td>
<td>24</td>
<td>22.2</td>
</tr>
<tr>
<td>Some college</td>
<td>9</td>
<td>8.3</td>
</tr>
<tr>
<td>University</td>
<td>5</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buddhist</td>
<td>56</td>
<td>51.8</td>
</tr>
<tr>
<td>Christian</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>None</td>
<td>23</td>
<td>21.3</td>
</tr>
<tr>
<td>Taoist</td>
<td>26</td>
<td>24.1</td>
</tr>
</tbody>
</table>
Table 3 Continued

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>No. of Caregivers</th>
<th>% of Caregivers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monthly Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; NT $20,001 (U.S. $575)</td>
<td>52</td>
<td>48.1</td>
</tr>
<tr>
<td>NT $20,001-30,000 (U.S. $575-862)</td>
<td>22</td>
<td>20.4</td>
</tr>
<tr>
<td>NT $30,001-40,000 (U.S. $862-1,149)</td>
<td>14</td>
<td>13.0</td>
</tr>
<tr>
<td>NT $40,001-50,000 (U.S. $1,149-1,437)</td>
<td>9</td>
<td>8.3</td>
</tr>
<tr>
<td>&gt; NT $50,000 (U.S. $1,437)</td>
<td>11</td>
<td>10.2</td>
</tr>
<tr>
<td><strong>Number of Assistants From Other Family Members During Weekdays</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>30</td>
<td>27.8</td>
</tr>
<tr>
<td>One person</td>
<td>46</td>
<td>42.6</td>
</tr>
<tr>
<td>Two persons</td>
<td>13</td>
<td>12.0</td>
</tr>
<tr>
<td>More than two persons</td>
<td>19</td>
<td>17.6</td>
</tr>
<tr>
<td><strong>Number of Assistants From Other Family Members on Weekends</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>30</td>
<td>27.8</td>
</tr>
<tr>
<td>One person</td>
<td>45</td>
<td>41.7</td>
</tr>
<tr>
<td>Two persons</td>
<td>15</td>
<td>13.9</td>
</tr>
<tr>
<td>More than two persons</td>
<td>18</td>
<td>16.7</td>
</tr>
<tr>
<td><strong>Health Perception</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>21</td>
<td>19.4</td>
</tr>
<tr>
<td>Fair</td>
<td>43</td>
<td>39.8</td>
</tr>
<tr>
<td>Good</td>
<td>29</td>
<td>26.9</td>
</tr>
<tr>
<td>Very good</td>
<td>4</td>
<td>3.7</td>
</tr>
<tr>
<td>Excellent</td>
<td>11</td>
<td>10.2</td>
</tr>
<tr>
<td><strong>Perception of Physical Activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste of time/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making physically uncomfortable</td>
<td>4</td>
<td>3.7</td>
</tr>
<tr>
<td>Good for health</td>
<td>97</td>
<td>89.8</td>
</tr>
<tr>
<td>Job</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>I don’t know</td>
<td>4</td>
<td>3.7</td>
</tr>
</tbody>
</table>

*Note.* aU.S. $1.00 = NT $34.80.
(75%) of the caregivers were married, and 25% were single or widowed. About two thirds (64.8%) of the caregivers had less than a senior high school education; only 12.9% had completed some education at a college or university. More than half (51.8%) of the family caregivers were Buddhist, and 24.1% were Taoist. Nearly half (48.1%) of the family caregivers reported average monthly incomes of less than NT $20,001 (U.S. $575); only 10.2% reported average monthly incomes of more than NT $50,000 (U.S. $1,437). Regarding employment, 40.7% were unemployed and 59.3% were employed.

As presented in Table 2, those who were employed outside the home worked an average of 23 hours (SD = 25.92) a week. Moreover, family caregivers reported an average of 2 hours (SD = 2.97) per day in providing care for the mentally ill patient, ranging from 0 to 16 hours; 75.9% spent less than 2 hours daily undertaking caregiving duties. The majority (42.6%) of the family caregivers received assistance from one other family member during weekdays; 29.6% received assistance from two or more family members; and 27.8% had no assistance during weekdays (see Table 3). Additionally, the majority (41.7%) received assistance from one other family member on weekends; 30.6% received assistance from two or more family members; and 27.8% had no assistance on weekends.

Caregivers’ Psychological Characteristics

Only 19.4% of the family caregivers perceived that their health was poor, and the remainder (80.6%) believed that their health status was fair to excellent (see Table 3). Most family caregivers (89.8%) thought that physical activity was good for their health; a mere 3.7% believed that it was a waste of time or it made them feel physically uncomfortable.
Prior Physical Activity Behavior

Family caregivers spent an average of 30.57 hours ($SD = 38.91$) engaging in moderate (3-6 METs) or vigorous (> 6 METs) physical activity over the preceding 2 weeks, with a range of 0 to 200 hours (see Table 2). Twenty-six moderate or vigorous activities were reported by 103 of the 108 caregivers. Of the 103 caregivers who reported at least one moderate or vigorous physical activity, cleaning house was the most frequent activity. The next most frequent activities were walking, farming, biking, gardening, and taking care of small children and ill adults.

The Distribution of Family Caregivers’ Stages

The Stages of Change for Regular Physical Activity Questionnaire was used to classify caregivers into one of the traditional five stages of change from the TTM. These five stages of change for regular physical activity included following:

1. Precontemplation: not engaging in regular physical activity and having no intention to begin regular physical activity within the next 6 months.
2. Contemplation: not engaging in regular physical activity but intending to begin regular physical activity within the next 6 months.
3. Preparation: not engaging in regular physical activity but intending to begin regular physical activity within 30 days.
4. Action: engaging in physical activity regularly but for less than 6 months.
5. Maintenance: engaging in physical activity regularly for more than 6 months.

Table 4 presents the distribution of the caregivers across the five stages of change from the TTM for regular physical activity. The majority (65.7%) of the caregivers were classified into the maintenance stage for regular physical activity, 20.4% in the
Table 4
Distribution of Five Stages of Family Caregivers' Physical Activity ($N = 108$)

<table>
<thead>
<tr>
<th>Stages</th>
<th>No. of Caregivers</th>
<th>% of Caregivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>22</td>
<td>20.4</td>
</tr>
<tr>
<td>Contemplation</td>
<td>6</td>
<td>5.6</td>
</tr>
<tr>
<td>Preparation</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>Action</td>
<td>6</td>
<td>5.6</td>
</tr>
<tr>
<td>Maintenance</td>
<td>71</td>
<td>65.7</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100.0</td>
</tr>
</tbody>
</table>
precontemplation stage, with a small proportion being in the contemplation (5.6%), preparation (2.8%), and action (5.6%) stages.

Because of the relatively small number of participants in the contemplation, preparation, and action stages, the resulting comparisons among stage groups were less reliable than if these three groups had larger numbers. Therefore, in order to strengthen and/or refute the results obtained in the study, a decision was made to collapse this variable to have more participants in fewer subgroups. Individuals in the contemplation and preparation stages intended to become more active, whereas those in the precontemplation did not intend to become active. Thus, I combined the stages of contemplation and preparation because caregivers in these two stages had an intention to do physical activity regularly. Additionally, caregivers in the action and maintenance stages had performed physical activity on a regular basis for a while. For that reason, I combined the data on these two stages. Consequently, a three-stage structure was proposed based on caregivers' intentions and behaviors for engaging in regular physical activity in this study. They were the precontemplation stage, the contemplation/preparation stage, and the action/maintenance stage. A description of each stage and its definition follows.

1. Precontemplation: those who did not engage in regular physical activity and who did not intend to begin within the next 6 months.

2. Contemplation/Preparation: those who did not engage in regular physical activity but intended to begin within 1 to 6 months.

3. Action/Maintenance: those who had engaged in regular physical activity in the past, from less than 6 months to more than 6 months.
Using these modified definitions, 20.4% of the family caregivers were in the precontemplation stage, 8.3% were in the contemplation/preparation stage, and 71.3% were in the action/maintenance stage (see Table 5).

The following results for this study are presented using the modified three stages of change for data analysis, instead of the traditional classifications (five stages) in the TTM. In order to explore the differences in the findings between the two classification systems, I also tested the traditional five stages with research hypotheses and questions. The use of three or five stages in data analysis yielded significant similarities and correlations; however, the application of three stages produced a stronger interpretation of the findings due to the larger number of caregivers in subgroups.

Findings

The findings for each specific purpose, research hypothesis, and research question are presented below.

Purpose (1)

The purpose was to determine whether constructs from the TTM are applicable to Taiwanese family caregivers relative to regular physical activity.

Hypothesis (1A)

Caregivers who are in later stages of the TTM (e.g., action or maintenance) will show a significantly higher level of self-efficacy relative to regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Differences in the overall self-efficacy among stage groups. The average of all 18 items from the Exercise Self-Efficacy Scale was calculated to indicate overall self-
Table 5

Distribution of Three Stages of Family Caregivers’ Physical Activity (N = 108)

<table>
<thead>
<tr>
<th>Stages</th>
<th>No. of Caregivers</th>
<th>% of Caregivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>22</td>
<td>20.4</td>
</tr>
<tr>
<td>Contemplation/Preparation</td>
<td>9</td>
<td>8.3</td>
</tr>
<tr>
<td>Action/Maintenance</td>
<td>77</td>
<td>71.3</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100.0</td>
</tr>
</tbody>
</table>
efficacy. A one-way ANOVA was used to examine the differences in the level of overall self-efficacy scores among the three stages. Overall self-efficacy scores were found to differ significantly by stage, $F (2, 105) = 32.27, p = .00$ (see Table 6 and Figure 2). A Scheffe post hoc test showed that caregivers in the action/maintenance stage scored a significantly higher level of overall self-efficacy relative to regular physical activity than other two stages ($p < .05$). The precontemplation group and contemplation/preparation group did not differ significantly from each other in their overall self-efficacy scores ($p > .05$).

Differences in each of the self-efficacy items among stage groups. Table 7 outlines the mean scores of each of the 18 items of the Exercise Self-Efficacy Scale for all respondents ($N = 108$). The results show that (a) caregivers had the highest mean score in their confidence that they could perform regular physical activity after a vacation ($M = 68.80, SD = 38.49$) and (b) caregivers had the lowest mean score in their confidence that they could carry out regular physical activity while experiencing physical discomfort during physical activity ($M = 38.89, SD = 40.52$).

In addition, a one-way ANOVA was used to assess the differences in mean scores of each self-efficacy item among the three stages. All of the 18 items of the self-efficacy scale were found to differ significantly by stage. A Scheffe or Dunnett’s C post hoc test was used to determine which specific pairs of means were significantly different from one another. The Scheffe was used in instances where variances were equal (Levene’s test > .05), and Dunnett’s C was used where the variances differed (Levene’s test < .05). Results of post hoc tests indicated that caregivers in the action/maintenance stage reported significantly higher self-efficacy scores than did those in the precontemplation
Table 6

Differences in the Means of Overall Self-Efficacy, Overall Perceived Benefits, and Perceived Barriers to Regular Physical Activity Among Three Stages (N = 108)

<table>
<thead>
<tr>
<th></th>
<th>PC(a)</th>
<th>C/P(b)</th>
<th>A/M(c)</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Overall Self-Efficacy</td>
<td>19.09</td>
<td>24.97</td>
<td>33.21</td>
<td>17.38</td>
</tr>
<tr>
<td>Overall Perceived Benefits</td>
<td>2.22</td>
<td>.74</td>
<td>2.86</td>
<td>.40</td>
</tr>
<tr>
<td>Overall Perceived Barriers</td>
<td>1.66</td>
<td>.77</td>
<td>1.59</td>
<td>.64</td>
</tr>
</tbody>
</table>

Note. \(a\)PC = Precontemplation Stage, \(b\)C/P = Contemplation/Preparation Stage, \(c\)A/M = Action/Maintenance Stage.

*\(p < .05\). **\(p < .01\).

Figure 2. Self-efficacy and stages of physical activity change.
Table 7
The Means and Standard Deviations for Exercise Self-Efficacy Items \((N = 108)\)

<table>
<thead>
<tr>
<th>Items</th>
<th>(M^a)</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Feeling tired</td>
<td>41.85</td>
<td>41.54</td>
</tr>
<tr>
<td>2. Under pressure from work</td>
<td>50.37</td>
<td>41.47</td>
</tr>
<tr>
<td>3. During bad weather</td>
<td>47.41</td>
<td>42.01</td>
</tr>
<tr>
<td>4. Recovering from an injury</td>
<td>48.89</td>
<td>40.54</td>
</tr>
<tr>
<td>5. Personal problems</td>
<td>61.30</td>
<td>39.41</td>
</tr>
<tr>
<td>6. Feeling depressed</td>
<td>60.83</td>
<td>39.70</td>
</tr>
<tr>
<td>7. Feeling anxious</td>
<td>59.81</td>
<td>38.39</td>
</tr>
<tr>
<td>8. Recovering from an illness</td>
<td>48.33</td>
<td>41.39</td>
</tr>
<tr>
<td>9. Physical discomfort</td>
<td>38.89</td>
<td>40.52</td>
</tr>
<tr>
<td>10. After a vacation</td>
<td>68.80</td>
<td>38.49</td>
</tr>
<tr>
<td>11. Too much work to do at home</td>
<td>46.11</td>
<td>42.27</td>
</tr>
<tr>
<td>12. Visitors are present</td>
<td>50.65</td>
<td>42.21</td>
</tr>
<tr>
<td>13. Other interesting things to do</td>
<td>56.30</td>
<td>42.21</td>
</tr>
<tr>
<td>14. Don’t reach physical activity goals</td>
<td>65.28</td>
<td>37.95</td>
</tr>
<tr>
<td>15. No support from family/friends</td>
<td>64.91</td>
<td>39.45</td>
</tr>
<tr>
<td>16. During a vacation</td>
<td>47.96</td>
<td>42.79</td>
</tr>
<tr>
<td>17. Other time commitments</td>
<td>45.46</td>
<td>40.73</td>
</tr>
<tr>
<td>18. Experiencing family problems</td>
<td>45.03</td>
<td>40.24</td>
</tr>
</tbody>
</table>

*Note.* \(^a^{*}\)Based on a 100-point scale in 10-unit intervals ranging from 0 (cannot do at all) through intermediate degrees of assurance such as 50 (moderately certain can do) to complete assurance, 100 (certainly can do).
stage in each of the 18 self-efficacy items (see Table 8). Moreover, caregivers in the action/maintenance stage stated significantly higher self-efficacy scores than did those in the contemplation/preparation stage in 10 items of the 18 self-efficacy items (see Table 8). These 10 self-efficacy items relative to regular physical activity were (a) feeling tired, (b) feeling under pressure from work, (c) engaging in physical activity after a vacation, (d) having too much work to do at home, (e) having visitors present, (f) having other interesting things to do, (g) not reaching physical activity goals, (h) having no support from family or friends, (i) having other time commitments, and (j) engaging in physical activity after experiencing family problem. However, caregivers in the contemplation/preparation stage (M = 63.33, SD = 33.54) only reported a significantly higher self-efficacy score in one item of engaging in regular physical activity during or after experiencing personal problems, compared to caregivers in the precontemplation stage (M = 23.64, SD = 38.24), F (2, 105) = 16.51, p = .00.

Hypothesis (1B)

Caregivers who are in later stages of the TTM (e.g., action or maintenance) will perceive significantly more benefits of regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Differences in the overall perceived benefit among stage groups. The average score across all 29 items from the Exercise Benefits Scale was estimated to show an overall perception of the benefits of regular physical activity. A one-way ANOVA and Scheffe post hoc analyses demonstrated a significant difference in the level of overall perception of benefits between precontemplation stage and action/maintenance stage caregivers, F (2, 105) = 4.12, p = .02, with action/maintenance stage caregivers scoring a
Table 8

Differences in the Means of Exercise Self-Efficacy Items Among Three Stages
\((N = 108)\)

<table>
<thead>
<tr>
<th>Items</th>
<th>PC(^a)</th>
<th>C/P(^b)</th>
<th>A/M(^c)</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(M )</td>
<td>SD</td>
<td>(M )</td>
<td>SD</td>
</tr>
<tr>
<td>Feeling tired</td>
<td>11.82</td>
<td>27.19</td>
<td>15.56</td>
<td>23.51</td>
</tr>
<tr>
<td>Under pressure from work</td>
<td>12.73</td>
<td>24.34</td>
<td>24.44</td>
<td>29.63</td>
</tr>
<tr>
<td>During bad weather</td>
<td>18.64</td>
<td>32.56</td>
<td>24.44</td>
<td>35.40</td>
</tr>
<tr>
<td>Recovering from an injury</td>
<td>21.82</td>
<td>32.61</td>
<td>45.56</td>
<td>38.77</td>
</tr>
<tr>
<td>Personal problems</td>
<td>23.64</td>
<td>38.24</td>
<td>63.33</td>
<td>33.54</td>
</tr>
<tr>
<td>Feeling depressed</td>
<td>23.64</td>
<td>39.22</td>
<td>54.44</td>
<td>36.78</td>
</tr>
<tr>
<td>Feeling anxious</td>
<td>26.36</td>
<td>39.22</td>
<td>57.78</td>
<td>32.32</td>
</tr>
<tr>
<td>Recovering from an illness</td>
<td>19.55</td>
<td>32.58</td>
<td>34.44</td>
<td>37.45</td>
</tr>
<tr>
<td>Physical discomfort</td>
<td>16.36</td>
<td>29.04</td>
<td>23.33</td>
<td>33.17</td>
</tr>
<tr>
<td>After a vacation</td>
<td>30.91</td>
<td>39.63</td>
<td>41.11</td>
<td>40.14</td>
</tr>
<tr>
<td>Too much work to do</td>
<td>9.09</td>
<td>19.98</td>
<td>24.44</td>
<td>33.95</td>
</tr>
<tr>
<td>Visitors are present</td>
<td>18.18</td>
<td>33.33</td>
<td>8.89</td>
<td>17.64</td>
</tr>
<tr>
<td>Other interesting things to do</td>
<td>19.09</td>
<td>34.21</td>
<td>35.56</td>
<td>32.83</td>
</tr>
<tr>
<td>Don’t reach goals</td>
<td>25.00</td>
<td>34.05</td>
<td>41.11</td>
<td>34.80</td>
</tr>
<tr>
<td>No support</td>
<td>26.82</td>
<td>36.17</td>
<td>38.89</td>
<td>35.86</td>
</tr>
<tr>
<td>During a vacation</td>
<td>10.45</td>
<td>20.11</td>
<td>28.89</td>
<td>31.80</td>
</tr>
<tr>
<td>Other time commitments</td>
<td>13.18</td>
<td>25.52</td>
<td>28.89</td>
<td>23.69</td>
</tr>
<tr>
<td>Experiencing family problem</td>
<td>16.36</td>
<td>27.35</td>
<td>6.67</td>
<td>11.18</td>
</tr>
</tbody>
</table>

*Note.* \(^a\)PC = Precontemplation Stage, \(^b\)C/P = Contemplation/Preparation Stage, \(^c\)A/M = Action/Maintenance Stage.

\(*\ast\ast p < .01.*
significantly higher level of overall perception of the benefits of regular physical activity than precontemplation caregivers ($p < .05$) (see Table 6 and Figure 3). However, a Scheffe showed no significant differences between the contemplation/preparation stage and other stages in the level of overall perception of the benefits of regular physical activity ($p > .05$).

Differences in each of the perceived benefits items among stage groups. Table 9 compares the mean scores of each of the 29 items from the Exercise Benefits Scale. Family caregivers had the highest mean score in perceived benefits of enjoyable physical activity ($M = 3.23, SD = .85$) and the lowest mean score in perceived benefits of increased acceptance by others because of the physical activity ($M = 2.08, SD = 1.03$).

A one-way ANOVA showed that the three stage groups were significantly different in the mean scores of 10 perceived benefits items. Again, Scheffe was used in instances where variances were equal (Levene’s test $>.05$) and Dunnett’s C was used for unequal variances (Levene’s test $<.05$). Findings showed that caregivers in the action/maintenance stage reported significantly higher scores in 10 items, compared to caregivers in precontemplation stage ($p < .05$) (see Table 10). These 10 items of perceived benefits of regular physical activity were (a) enjoying physical activity, (b) decreasing feelings of stress and tension, (c) improving mental health, (d) giving a sense of personal accomplishment, (e) meeting with new people, (f) improving self-concept, (g) increasing mental alertness, (h) carrying out normal activity without tiredness, (i) increasing acceptance by others, and (j) improving the way their body looks. Additionally, caregivers in the contemplation/preparation stage reported significantly higher scores than did those in the precontemplation stage in five items ($p < .05$): (a)
Figure 3. Perceived benefits and stages of physical activity change.
Table 9
The Means and Standard Deviations for Perceived Benefits Items \((N = 108)\)

<table>
<thead>
<tr>
<th>Items</th>
<th>(M^a)</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enjoying physical activity</td>
<td>3.23</td>
<td>.85</td>
</tr>
<tr>
<td>2. Decreasing stress and tension</td>
<td>2.79</td>
<td>1.06</td>
</tr>
<tr>
<td>3. Improving mental health</td>
<td>2.82</td>
<td>1.02</td>
</tr>
<tr>
<td>4. Preventing heart attacks</td>
<td>2.63</td>
<td>1.14</td>
</tr>
<tr>
<td>5. Increasing muscle strength</td>
<td>2.71</td>
<td>1.08</td>
</tr>
<tr>
<td>6. Giving personal accomplishment</td>
<td>2.50</td>
<td>1.08</td>
</tr>
<tr>
<td>7. Feeling relaxed</td>
<td>2.80</td>
<td>1.09</td>
</tr>
<tr>
<td>8. Contacting with friends and persons I enjoy</td>
<td>2.63</td>
<td>1.10</td>
</tr>
<tr>
<td>9. Keeping me from having high blood pressure</td>
<td>2.64</td>
<td>1.12</td>
</tr>
<tr>
<td>10. Improving functioning of cardiovascular system</td>
<td>2.70</td>
<td>1.10</td>
</tr>
<tr>
<td>11. Improving the level of physical fitness</td>
<td>2.84</td>
<td>1.04</td>
</tr>
<tr>
<td>12. Improving muscle tone</td>
<td>2.76</td>
<td>1.08</td>
</tr>
<tr>
<td>13. Improving feelings of well being</td>
<td>2.90</td>
<td>1.07</td>
</tr>
<tr>
<td>14. Increasing my stamina</td>
<td>2.71</td>
<td>1.08</td>
</tr>
<tr>
<td>15. Improving my flexibility</td>
<td>2.67</td>
<td>1.09</td>
</tr>
<tr>
<td>16. Improving my disposition</td>
<td>2.39</td>
<td>1.13</td>
</tr>
<tr>
<td>17. Sleeping better at night</td>
<td>2.75</td>
<td>1.17</td>
</tr>
<tr>
<td>18. Living longer</td>
<td>2.52</td>
<td>1.10</td>
</tr>
<tr>
<td>19. Decreasing fatigue</td>
<td>2.42</td>
<td>1.02</td>
</tr>
<tr>
<td>20. A good way to meet with new people</td>
<td>2.59</td>
<td>1.12</td>
</tr>
<tr>
<td>21. Improving my physical endurance</td>
<td>2.69</td>
<td>1.03</td>
</tr>
</tbody>
</table>
Table 9 Continued

<table>
<thead>
<tr>
<th>Items</th>
<th>$M^a$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving my self-concept</td>
<td>2.24</td>
<td>1.03</td>
</tr>
<tr>
<td>Increasing my mental alertness</td>
<td>2.19</td>
<td>1.02</td>
</tr>
<tr>
<td>Carrying out normal activities without tiredness</td>
<td>2.22</td>
<td>1.11</td>
</tr>
<tr>
<td>Improving the quality of my work</td>
<td>2.30</td>
<td>1.04</td>
</tr>
<tr>
<td>Good entertainment</td>
<td>2.87</td>
<td>1.02</td>
</tr>
<tr>
<td>Increasing my acceptance by others</td>
<td>2.08</td>
<td>1.03</td>
</tr>
<tr>
<td>Improving my overall body functioning</td>
<td>2.81</td>
<td>1.05</td>
</tr>
<tr>
<td>Improving the way my body looks</td>
<td>2.59</td>
<td>1.07</td>
</tr>
</tbody>
</table>

*Note.* $^a$Based on a 4-point Likert scale ranging from 1 to 4 (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree).
Table 10

Differences in the Means of Perceived Benefits Items Among Three Stages (N = 108)

<table>
<thead>
<tr>
<th>Items</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoying physical activity</td>
<td>2.73</td>
<td>1.12</td>
<td>3.11</td>
<td>.78</td>
<td>3.29</td>
<td>.71</td>
<td>5.78*</td>
<td>.00</td>
</tr>
<tr>
<td>Decreasing stress</td>
<td>2.23</td>
<td>1.11</td>
<td>3.11</td>
<td>.78</td>
<td>2.91</td>
<td>1.03</td>
<td>4.25*</td>
<td>.02</td>
</tr>
<tr>
<td>Improving mental health</td>
<td>2.27</td>
<td>1.08</td>
<td>3.00</td>
<td>.05</td>
<td>2.96</td>
<td>1.01</td>
<td>4.28*</td>
<td>.02</td>
</tr>
<tr>
<td>Personal accomplishment</td>
<td>1.95</td>
<td>1.05</td>
<td>2.56</td>
<td>.73</td>
<td>2.65</td>
<td>1.09</td>
<td>3.73*</td>
<td>.03</td>
</tr>
<tr>
<td>Improving my disposition</td>
<td>1.95</td>
<td>1.17</td>
<td>2.89</td>
<td>.60</td>
<td>2.45</td>
<td>1.13</td>
<td>5.78**</td>
<td>.00</td>
</tr>
<tr>
<td>Meeting new people</td>
<td>2.05</td>
<td>1.09</td>
<td>2.56</td>
<td>.73</td>
<td>2.75</td>
<td>1.13</td>
<td>3.59*</td>
<td>.03</td>
</tr>
<tr>
<td>Improving my self-concept</td>
<td>1.68</td>
<td>.84</td>
<td>2.78</td>
<td>.67</td>
<td>2.34</td>
<td>1.06</td>
<td>5.17**</td>
<td>.01</td>
</tr>
<tr>
<td>Increasing mental alertness</td>
<td>1.59</td>
<td>.80</td>
<td>2.67</td>
<td>.71</td>
<td>2.30</td>
<td>1.04</td>
<td>5.73**</td>
<td>.00</td>
</tr>
<tr>
<td>Activities without tiredness</td>
<td>1.68</td>
<td>.89</td>
<td>2.11</td>
<td>.78</td>
<td>2.39</td>
<td>1.15</td>
<td>3.74*</td>
<td>.03</td>
</tr>
<tr>
<td>My acceptance by others</td>
<td>1.55</td>
<td>.74</td>
<td>2.78</td>
<td>.83</td>
<td>2.16</td>
<td>1.06</td>
<td>5.66**</td>
<td>.01</td>
</tr>
<tr>
<td>Improving my body’s looks</td>
<td>2.00</td>
<td>.93</td>
<td>3.11</td>
<td>.78</td>
<td>2.70</td>
<td>1.08</td>
<td>5.23**</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Note. aPC = Precontemplation Stage, bC/P = Contemplation/Preparation Stage, cA/M = Action/Maintenance Stage.
*p < .05. **p < .01.
improving disposition, (b) improving self-concept, (c) increasing mental alertness, (d) increasing acceptance by others, and (e) improving the way their body looks (see Table 10). There were no significant differences on any item between caregivers in the contemplation/preparation stage and in the action/maintenance stage.

Hypothesis (1C)

Caregivers who are in later stages of the TTM (e.g., action or maintenance) will perceive significantly fewer barriers to regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Differences in the overall perceived barriers among stage groups. The average of all 14 items from the Exercise Barriers Scale was computed to indicate an overall perception of the barriers to regular physical activity. A one-way ANOVA was conducted to examine the differences in the level of overall perception of barriers among stage groups. Since variances were unequal (Levene’s test < .05), Dunnett’s C post hoc was used to determine the differences across stage groups. Results of Dunnett’s C test showed no significant differences in the level of overall perception of barriers to regular physical activity among three stages, $F(2, 105) = 2.84, p = .06$ (see Table 6 and Figure 4).

Differences in each of the perceived barriers items among stage groups. Table 11 displays the mean scores of each of the 14 items in the Exercise Barriers Scale. The results showed that caregivers had the highest mean score in perceived barriers for physical activity because the physical activity made them tired ($M = 2.11, SD = 1.10$), whereas caregivers showed the lowest mean score in perceived barriers to physical activity related to the expense of physical activity ($M = 1.28, SD = .54$).
Figure 4. Perceived barriers and stages of physical activity change.
Table 11

The Means and Standard Deviations for Perceived Barriers Items (N = 108)

<table>
<thead>
<tr>
<th>Items</th>
<th>$M^a$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Taking too much time</td>
<td>1.55</td>
<td>.83</td>
</tr>
<tr>
<td>2. Tiring me</td>
<td>2.11</td>
<td>1.10</td>
</tr>
<tr>
<td>3. Places are too far away</td>
<td>1.44</td>
<td>.69</td>
</tr>
<tr>
<td>4. Too embarrassed to do physical activity</td>
<td>1.36</td>
<td>.60</td>
</tr>
<tr>
<td>5. It costs too much to do physical activity</td>
<td>1.28</td>
<td>.54</td>
</tr>
<tr>
<td>6. Facilities do not have convenient schedules</td>
<td>1.35</td>
<td>.62</td>
</tr>
<tr>
<td>7. I am fatigued by physical activity</td>
<td>1.77</td>
<td>.96</td>
</tr>
<tr>
<td>8. Spouse or significant other does not encourage me</td>
<td>1.39</td>
<td>.70</td>
</tr>
<tr>
<td>9. Taking too much time from family responsibilities</td>
<td>1.38</td>
<td>.65</td>
</tr>
<tr>
<td>10. People in physical activity clothes look funny</td>
<td>1.32</td>
<td>.56</td>
</tr>
<tr>
<td>11. Family members do not encourage me</td>
<td>1.29</td>
<td>.55</td>
</tr>
<tr>
<td>12. Taking too much time from family relationships</td>
<td>1.36</td>
<td>.62</td>
</tr>
<tr>
<td>13. Hard work for me</td>
<td>1.40</td>
<td>.71</td>
</tr>
<tr>
<td>14. Too few places to do physical activity</td>
<td>1.38</td>
<td>.64</td>
</tr>
</tbody>
</table>

Note. $^a$Based on a 4-point Likert scale ranging from 1 to 4 (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree).
A one-way ANOVA and post hoc Scheffe and Dunnett’s C analyses demonstrated that caregivers in the contemplation/preparation stage ($M = 1.33, SD = .50$) showed a significantly lower score of perceived barriers to regular physical activity than did those in the precontemplation stage ($M = 2.33, SD = 1.19$) in believing that the physical activity made them fatigued, $F(2, 105) = 3.88, p = .02$. However, the three stages did not significantly differ on other barriers items.

**Purpose (2)**

The purpose was to explore the factors that affect constructs from the TTM (e.g., stages of change, self-efficacy, perceive benefits, and perceived barriers).

**Question (2A)**

What is the relationship between caregivers’ stages in the TTM and caregivers’ demographics?

The correlation coefficients between caregivers’ stages of regular physical activity and the demographic variables are shown in Table 12. Stages of change were significantly and positively related to caregivers’ age ($r_s (108) = .24, p < .05$) and hours of physical activity for the past 2 weeks ($r_s (108) = .65, p < .01$), indicating that caregivers who were older and who spent more time in physical activity during the past 2 weeks were more likely to be in the later stages (e.g., action/maintenance). The findings show that the stages of change were not significantly related to the following caregivers’ characteristics: BMI (kg/m$^2$), the amount of time spent in caregiving per day, the number of hours employed outside the home per week, educational level, monthly income, the
Table 12
Correlations Between Caregivers’ Stages and Demographics (N = 108)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
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<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stages</td>
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<td>.24*</td>
<td>-.04</td>
<td>.17</td>
<td>-.11</td>
<td>-.12</td>
<td>-.02</td>
<td>-.01</td>
<td>.03</td>
<td>.02</td>
<td>.65**</td>
</tr>
<tr>
<td>2. Age</td>
<td></td>
<td>.04</td>
<td>.15</td>
<td>-.15</td>
<td>-.41**</td>
<td>-.39**</td>
<td>-.30**</td>
<td>-.29**</td>
<td>-.31**</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>3. Body Mass Index</td>
<td></td>
<td>.09</td>
<td>.11</td>
<td>-.02</td>
<td>.27**</td>
<td>-.18</td>
<td>-.19</td>
<td>.03</td>
<td>-.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Daily Hours Caring for Patients</td>
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<td>-.02</td>
<td>.01</td>
<td>-.02</td>
<td>-.22*</td>
<td>.07</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Weekly Working Hours</td>
<td></td>
<td>.08</td>
<td>.13</td>
<td>.04</td>
<td>-.01</td>
<td>.14</td>
<td>.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Educational Level</td>
<td></td>
<td>.47**</td>
<td>.26**</td>
<td>.25**</td>
<td>.18</td>
<td>-.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Monthly Income</td>
<td></td>
<td>.17</td>
<td>.17</td>
<td>.31**</td>
<td>-.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Help During Weekdays</td>
<td></td>
<td>.93**</td>
<td>.28**</td>
<td>-.20*</td>
<td></td>
<td></td>
<td></td>
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<td>9. Help on Weekends</td>
<td></td>
<td>.29**</td>
<td>-.17</td>
<td></td>
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<td></td>
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<tr>
<td>10. Health Perception</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>11. Hours of Physical Activity for the Past 2 Weeks</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*p < .05. **p < .01.
amount of support caregivers received from other family members for caregiving during weekdays and on weekends, and the perceived health status of the caregivers.

The results of the chi-square analysis suggested that the family caregivers' stages of change were significantly associated with caregivers' relationship to the patient, $\chi^2 (6, N = 108) = 13.68, p = .03$ (see Table 13). A larger proportion (88.9%) of the family caregivers who were not a spouse, child, or parent were in the action/maintenance stage, whereas only 70.4% of the spouse caregivers, 47.4% of the child caregivers, and 75% of the parent caregivers were in the action/maintenance stage. In addition, these relatives had a lower percentage in both precontemplation stage and contemplation/preparation stage than did other caregivers.

The results of the chi-square test also showed that the family caregivers' stages were significantly associated with the caregivers' marital status, $\chi^2 (6, N = 108) = 10.56, p = .03$ (see Table 13). A higher proportion of caregivers who were in the action/maintenance stage were married (76.5%), compared to those who were single (42.9%) or widowed (69.2%). Married caregivers also showed a lower proportion in both precontemplation stage and contemplation/preparation stage than did other caregivers.

However, there was no significant association between the family caregivers' stages of change and family caregivers' gender, religion, disease history, and perception of physical activity.

**Question (2B-1)**

What is the relationship between the level of self-efficacy relative to regular physical activity and caregivers' demographics?

As shown in Table 14, a significant positive relationship was found between the
Table 13

Associations Between Stages of Physical Activity and Demographic Variables
\( (N = 108) \)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>PC&lt;sup&gt;a&lt;/sup&gt;</th>
<th>C/P&lt;sup&gt;b&lt;/sup&gt;</th>
<th>A/M&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Total</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>10</td>
<td>6</td>
<td>45</td>
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<td>32</td>
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<td>9</td>
<td>77</td>
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<td>33</td>
<td>44</td>
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<td>18</td>
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<td>77</td>
<td>108</td>
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<td>77</td>
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<td>77</td>
<td>108</td>
<td>100.0</td>
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</table>
Table 13 Continued

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>PC\textsuperscript{a}</th>
<th>C/P\textsuperscript{b}</th>
<th>A/M\textsuperscript{c}</th>
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<th>$\chi^2$</th>
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<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
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<td>Perception of Physical Activity</td>
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<td></td>
<td></td>
</tr>
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<td>Waste of time/uncomfortable</td>
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<td>1</td>
<td>25.0</td>
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<td>Good for health</td>
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<td>0</td>
<td>0.0</td>
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<td>50.0</td>
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<td>0.0</td>
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</tr>
<tr>
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<td>20.4</td>
<td>9</td>
<td>8.3</td>
<td>77</td>
</tr>
</tbody>
</table>

*Note. \textsuperscript{a}PC = Precontemplation Stage, \textsuperscript{b}C/P = Contemplation/Preparation Stage, \textsuperscript{c}A/M = Action/Maintenance Stage.\n
*$p < .05.$
Table 14
Correlations Among Self-Efficacy, Perceived Benefits, Perceived Barriers, and Demographics ($N = 108$)

<table>
<thead>
<tr>
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<th>4</th>
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<td>_</td>
<td>.11</td>
<td>-.14</td>
<td>.02</td>
<td>-.10</td>
<td>.31**</td>
<td>.11</td>
</tr>
<tr>
<td>2. Benefits</td>
<td>_</td>
<td>.06</td>
<td>.12</td>
<td>.20*</td>
<td>.15</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td>3. Barriers</td>
<td>_</td>
<td>.34**</td>
<td>.29**</td>
<td>.03</td>
<td>-.30**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Daily Hours Caring for Patients</td>
<td>_</td>
<td>.08</td>
<td>.07</td>
<td>-.22**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Weekly Working Hours</td>
<td>_</td>
<td>.07</td>
<td>.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Hours of Physical Activity for the Past 2 Weeks</td>
<td>_</td>
<td>-.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Health Perception</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*p < .05. **p < .01.
level of caregivers' overall self-efficacy and the hours of physical activity for the past 2 weeks \( (r (108) = .31, p < .01) \), indicating that caregivers who spent more time in physical activity during the past 2 weeks were more likely to have a higher level of overall self-efficacy to engage in regular physical activity. However, there were no significant findings between the level of caregivers' overall self-efficacy and caregivers' age, BMI (kg/m²), the amount of time spent in caregiving, working hours, educational level, monthly income, the amount of support caregivers received from other family members for caregiving, and perceived health.

Question (2B-2)

What is the difference in the level of self-efficacy relative to regular physical activity among demographic subgroups of caregivers?

A one-way ANOVA was used to assess the significant differences in the level of caregivers' overall self-efficacy among different demographic subgroups (i.e., gender, relationship to patient, religion, marital status, disease history, and perception of physical activity). Results showed that there were no significant differences in the level of caregivers' overall self-efficacy among demographic subgroups of caregivers \( (p > .05) \).

Question (2C-1)

What is the relationship between the level of perceived benefits of regular physical activity and caregivers' demographics?

The correlation results presented in Table 14 suggest that the level of caregivers' overall perception of the benefits of regular physical activity was significantly and positively related to the number of hours employed outside the home per week \( (r (108) = \)
indicating that caregivers who worked more hours outside the home weekly had a tendency to perceive more benefits of regular physical activity. There was no significant relationship between the level of caregivers’ overall perception of benefits and caregivers’ age, BMI (kg/m²), educational level, the amount of time spent in caregiving, income, the amount of support caregivers received from other family members for caregiving, perceived health, and hours of physical activity for the past 2 weeks.

**Question (2C-2)**

What is the difference in the level of perceived benefits of regular physical activity among demographic subgroups of caregivers?

A one-way ANOVA and post hoc Scheffe analyses demonstrated that family caregivers who thought that physical activity was good for their health (M = 2.69, SD = .73) showed a significantly higher level of overall perception of the benefits of regular physical activity than did those who had no idea about physical activity (M = 1.35, SD = .64), F(3, 104) = 3.88, p = .00. However, the level of caregivers’ overall perception of benefits did not significantly differ on other demographic subgroups of caregivers (i.e., gender, relationship to patient, religion, marital status, and disease history).

**Question (2D-1)**

What is the relationship between the level of perceived barriers to regular physical activity and caregivers’ demographics?

As seen in Table 14, the level of caregivers’ overall perception of the barriers to regular physical activity was significantly and positively related to the number of hours spent in providing care for the mentally ill patient per day (r(108) = .34, p < .01) and the
number of hours employed outside the home per week ($r (108) = .29, p < .01$), indicating that caregivers who spent more time in providing care for the patient daily and who worked more hours outside the home weekly were likely to perceive more barriers to regular physical activity. Additionally, the level of caregivers’ overall perception of barriers was significantly and negatively related to caregivers’ health perception ($r, (108) = -.30, p < .01$), indicating that caregivers who felt their health status was poorer tended to perceive more barriers to regular physical activity. No significant findings were observed between the level of overall perception of barriers and caregivers’ age, BMI ($kg/m^2$), educational level, income, the amount of support caregivers received from other family members for caregiving, and hours of physical activity for the past 2 weeks.

**Question (2D-2)**

What is the difference in the level of perceived barriers to regular physical activity among demographic subgroups of caregivers?

The results of a one-way ANOVA showed that the level of caregivers’ overall perception of the barriers to regular physical activity did not significantly differ among demographic subgroups of caregivers (i.e., gender, relationship to patient, religion, marital status, disease history, and perception of physical activity).

Figure 5 summarizes the relationships between the constructs from the TTM and caregivers’ demographic variables.
Figure 5. Relationships between demographic factors and constructs from the transtheoretical model.

Note. Statistics used *Spearman rho, †Pearson correlation, ‡one-way ANOVA, §chi-square. All results were significant, $p < .05$. 
CHAPTER 5

SUMMARY AND RECOMMENDATIONS

Summary of Results and Discussion

The Characteristics of Family Caregivers in Taiwan

Data were collected from 108 family caregivers of mentally ill patients currently receiving home care from a psychiatric hospital in Tainan, Taiwan. Of the 108 caregivers, 56.5% were female, the mean age was 52.24 years. Patients’ parents accounted for the largest subgroup of caregivers (40.7%) and most caregivers (75%) were married. Well over half (64.8%) of the caregivers had less than a senior high school education; only 12.9% had completed some education at a college or university. Roughly half (51.8%) were Buddhist and 24.1% were Taoist. Regarding employment, 40.7% were unemployed and 59.3% were currently in the paid work force. Those who were employed outside the home worked an average of 23 hours a week. In addition, about two thirds (68.5%) of the family caregivers in this study reported that their average monthly incomes were less than NT $30,001 (U.S. $862), at a time when the national monthly income average was about NT $37,268 (U.S. $1070.92) (Department of Accounting of the Executive Yuan of Taiwan, 2002). The great majority (80.6%) rated their health as fair to excellent. Almost half (54.6%) of the caregivers reported no disease of any kind, whereas 38% thought that they had disease. The data suggest that most family caregivers were healthy parents with less than a senior high school education.
and low income. In general, these family caregivers' sociodemographic characteristics are similar to those of samples of caregivers studied previously (Hu et al., 1994; Tung, 1998).

It should be noted that although the mean BMI (kg/m\(^2\)) of the caregivers was 22.91 kg/m\(^2\)--within the normal range in Taiwan--33.3% of the caregivers were overweight or obese. For most of the caregivers, this may be associated with the physiological consequences of aging. However, the data hint that the percentage of Taiwanese caregivers who were overweight or obese is much lower than what would be found in the United States, since the National Health and Nutrition Examination Survey 1999 indicated that 61% of U.S. adults are overweight or obese, defined as having a BMI (kg/m\(^2\)) of 25 kg/m\(^2\) or more (CDC, 2002).

Even though the average time spent providing care for the mentally ill family member was 2 hours per day, approximately three fourths (75.9%) spent less than 2 hours daily undertaking caregiving duties. Only 27.8% of the caregivers received no assistance from family members during weekdays and on weekends; the remaining caregivers received assistance from one or more family members. Such information indicated that caregiving responsibilities of the primary family caregivers seem to be shared by other family members. It is possible that these results were affected by the factor that the caregivers and their families in this study lived in a rural part of Taiwan where large family structures are common. If this study were conducted in a metropolitan area of Taiwan, such as Taipei City, the results might be different.

It is clear the family caregivers in this study understood the value of physical activity, because the great proportion of caregivers (89.8%) stated that physical activity
was good for their health. This conflicts with Wang’s findings (1998) among women aged 40 to 60 in Taipei City who perceived exercise as wasting energy and a male activity. It is possible that there may be differences in time pressures and social influences affecting physical activity or exercise between rural and metropolitan Taiwan.

Physical Activity of Family Caregivers in Taiwan

The types of physical activities in Taiwan. The most prevalent physical activity among the caregivers in Taiwan was house cleaning. Other popular activities were walking, farming, biking, gardening, and taking care of small children and ill adults. Aside from walking and biking, these popular activities were occupational related and home related. This may reflect the factor that the caregivers in this study had lower socioeconomic status and thus greater caregiving responsibilities, time devoted to childcare, and physical labor as an occupation and obligation (Seefeldt, Malina, & Clark, 2002). This interpretation would also explain why caregivers felt most confident that they could perform regular physical activity “after a vacation” (see Table 7). In addition, this interpretation clarifies why caregivers perceived “the expense of physical activity” as the least barrier to physical activity (see Table 11).

Stage distribution. A majority of the family caregivers (71.3%) were in the action/maintenance stage, 8.3% were in the contemplation/preparation stage, and 20.4% were in the precontemplation stage. In comparison to a study of adults in the United States which reported that 60% are insufficiently active and 25% are not active at all (U.S. Department of Health and Human Service, 1996), a seemingly larger percentage of caregivers in Taiwan engaged in regular physical activity. The proportion of caregivers in the action/maintenance stage was also higher than what existing data describe for
Western adults’ physical activity and exercise behavior (Booth et al., 1993; Boyle et al., 1998; Gonzalez & Jirovec, 2001; Gorely & Gordon, 1995; Herrick et al., 1997; Laffrey, 2000; Marcus & Owen, 1992; Marcus, Rossi, et al., 1992; Plotnikoff et al., 2001). Stage distribution differences between the Taiwanese caregivers and the Western adults could reflect the influence of cultural differences. For example, the most prevalent activities among Taiwanese caregivers were cleaning house and taking care of small children and ill adults. These home-related activities may be a priority for these caregivers because of established norms in Taiwanese society. As a result, caregivers typically performed these activities on most days of the week, which could explain the differences. These cultural norms may also have influenced the data through social desirability bias, in that caregivers may have felt that I wanted to find normative behaviors from them. Therefore, responses may have been biased toward higher stage and/or physical activity levels.

Another factor contributing to the distribution differences for physical activity is that this study involved all kinds of physical activities, whereas most TTM research from the West studied only exercise behavior. Additionally, this result could indicate the impact of Chinese attitudes toward physical activity: “If you want to live, you need to pursue an active life and to participate in active body movements,” as several caregivers stated. Thus the caregivers cultivated physically active lifestyles in order to live longer. Finally, perhaps individuals from the West are less active simply due to greater mechanization of work and of many domestic chores and to the greater prevalence and thus social acceptability of excessive weight and obesity.

Unexpectedly, the distribution of caregivers in the action/maintenance stage was higher than in previous Eastern studies by Callaghan et al. (2002) and Wakui et al.
Again, a possible reason is that all types of physical activities were included in this survey, whereas Callaghan et al. (2002) and Wakui et al. (2002) investigated only exercise behavior among undergraduate students. It could also be the case that these discrepancies result from differences in age. In Eastern cultures, exercise and physical activity are seen as recreation and considered less valuable than academic study for students (Callaghan et al., 2002). For this reason, students in these earlier studies may have participated in less exercise or physical activity. Finally, a possible explanation of the different stage distribution is the lack of a concrete definition of exercise in these two earlier studies.

**Hours of physical activity for the past 2 weeks.** Caregivers spent 30.57 hours engaging in moderate or vigorous physical activity over the preceding 2 weeks. This finding computes to an average of 2.18 hours per day, exceeding the CDC and ACSM recommendations of at least 30 minutes of moderate activity for more than 5 days of the week, or at least 3 days of vigorous activity per week for at least 20 minutes each time (Pate et al., 1995). Because caregivers completed the questionnaire in fair-weather months (e.g., September and October), the season of the year may have biased the results. Moreover, as noted previously, family caregivers reported that the most frequent activities were home-related and occupation-related, which serves as a reminder that caregivers’ low socioeconomic status may explain the great amount of time that they devoted to physical activity.

**The Results of Examination of the TTM in Taiwan**

**Self-efficacy and stages of change.** The level of overall self-efficacy relative to regular physical activity was significantly higher in the action/maintenance stage.
compared to the precontemplation and contemplation/preparation stages. Although there was no significant difference in the level of overall self-efficacy between the precontemplation and contemplation/preparation stages in this study, scores increased across different stages (see Table 6). This result is consistent with previous TTM findings in the physical activity and exercise literature from both West and East (Callaghan et al., 2002; Gorely & Gordon, 1995; Herrick et al., 1997; Laffrey, 2000; Marcus & Owen, 1992; Plotnikoff et al., 2001; Wakui et al., 2002). Results also support hypothesis 1A, that caregivers who are in later stages of the TTM (e.g., action or maintenance) will show a significantly higher level of self-efficacy relative to regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Perceived benefits and stages of change. The results of the study show that caregivers in the action/maintenance stage perceived significantly greater benefits of regular physical activity than those in the precontemplation stage, even though no significant difference between the contemplation/preparation stage and other stages was detected (see Table 6). This finding is consistent with earlier TTM research on physical activity and exercise from both West and East (Callaghan et al., 2002; Gorely & Gordon, 1995; Herrick et al., 1997; Marcus & Owen, 1992; Marcus, Rossi, et al., 1992; Plotnikoff et al., 2001; Wakui et al., 2002). This result provides support for hypothesis 1B, that caregivers who are in later stages of the TTM (e.g., action or maintenance) will perceive significantly more benefits of regular physical activity than those in earlier stages (e.g., precontemplation or contemplation).

Perceived barriers and stages of change. It was hypothesized that caregivers who are in later stages of the TTM (e.g., action or maintenance) will perceive significantly
fewer barriers to regular physical activity than those in earlier stages (e.g., precontemplation or contemplation). However, there were no significant differences in the level of caregivers' overall perception of barriers across stages, even though a decrease in *cons* from the precontemplation stage to the action/maintenance stage was noticed (see Table 6). This result indicates that caregivers from all stages had similar perceptions of the barriers to regular physical activity. Based on the results from this study, hypothesis 1C was not supported.

It is interesting to find that the lack of significant difference in perceived barriers to regular physical activity concurs with earlier TTM work in exercise from the East (Callaghan et al., 2002; Wakui et al., 2002). In contrast, it conflicts with previous findings from the West (Gorely & Gordon, 1995; Herrick et al., 1997; Marcus & Owen, 1992; Marcus, Rossi, et al., 1992; Plotnikoff et al., 2001). There are several possible reasons for the lack of a relationship between perceived barriers to regular physical activity and different stages of the TTM. First, findings for populations in the West may not generalize to the East. If this is the case, specific models of physical activity behavior for Eastern people probably need to be developed. Second, the word "barrier" was viewed as a negative expression in the East. It is possible that these results reflect a social desirability bias whereby individuals in Eastern societies have a tendency to give answers in positive terms these being socially normative. Another explanation may be that some of the content from the Exercise Barriers Scale (Sechrist et al., 1987) was not applicable to this study, as the Exercise Barriers Scale was developed to measure the perceived barriers to *exercise*, whereas this study sought to measure perceived barriers to *physical activity*. For instance, for family caregivers who regularly farmed or cleaned
house as their physical activities, items from the Exercise Barriers Scale such as “I am too embarrassed to exercise,” “It costs too much to do exercise,” “I think people in exercise clothes look funny,” “My family members do not encourage me to exercise,” or “There are too few places for me to exercise” would be inappropriate. Finally, subjects from this study and from two others’ TTM studies in China and Japan just perceived no barriers to regular physical activity or exercise at all.

In summary, the findings for self-efficacy and perceived benefits of regular physical activity are in general agreement with the TTM predictions. Conversely, no significant difference was found in the level of perceived barriers across different TTM stages. These results taken together serve to partially support the utility of the TTM for understanding regular physical activity in Taiwanese family caregivers. Given that participants in this study, as compared to previous TTM studies, were generally more active and from a different country, the similarity of this study’s results for self-efficacy and perceived benefits to the results presented in earlier literature provides additional support for the applicability of the TTM across populations.

Factors Related to Constructs of the TTM

Factors related to stages of change. As expected, caregivers who were in the later stages (e.g., action/maintenance) were more likely to spend more time in physical activity during the past 2 weeks, providing support for the findings of Wakui et al. (2002).

Age was significantly and positively related to the stages of change, indicating that older caregivers were more likely to be in the action/maintenance stage compared to younger caregivers. Interestingly, it was also discovered that older caregivers with less education, lower income, and more negative health perceptions were more likely to
engage in regular physical activity (see Table 12). Most Western studies suggest that older adults are less likely to adopt and maintain an active lifestyle (Booth et al., 1993; Marcus & Owen, 1992; Marcus, Rossi, et al., 1992; Sisk, 2000). This apparent inconsistency can be explained by the fact that the older caregivers in this study received less assistance from other family members in taking care of the mentally ill patient. This possibility was supported by significantly negative correlation coefficients between age and the amount of support caregivers received from other family members for caregiving during weekdays and on weekends ($r$, (108) = -.30, and -.29, respectively, $p < .01$) (see Table 12). A second explanation may be that lower socioeconomic status resulted in older caregivers’ performing physical labor such as farming, gardening, house cleaning, and childcare as part of their obligatory occupational and home-related activities. Furthermore, it is possible that active lifestyles among older individuals are more prevalent in Taiwanese culture than in the West.

Married caregivers had a higher proportion in the action/maintenance stage compared to those who were single or widowed. In addition, married caregivers showed a lower proportion in both the precontemplation and contemplation/preparation stages compared to other caregivers. However, no previous studies have specifically described the relationships between marital status and stages of change for physical activity behavior. This finding could reflect the influence of Taiwanese cultural profiles. For example, these married family caregivers were obliged to take care of three or more families--original family, marital family, and in-law family--because of social norms in Taiwan. For that reason, they may spend a greater amount of time in domestic physical labor for three or more families.
Little information exists about how types of relationships with the care-recipient affect physical activity behavior. In this study, family caregivers who were not a spouse, child, or parent were more likely to be in the action/maintenance stage. These caregivers were *in-laws*: mother-in-law, daughter-in-law, sister-in-law, and so on. Due to gender roles in Taiwan, cleaning house and taking care of a child or an ill family member are understood as a woman's responsibility. Therefore, a potential explanation for this result may be that these *married female* caregivers carried more responsibility for physical activities such as cleaning houses for two families and taking care of small children and ill adults.

Previous Western studies have reported that several factors have systemically emerged as determinants of physical activity in adults, such as educational level, gender, BMI (kg/m$^2$), income, and the perception of health status (Boyle et al., 1998; Burton et al., 1997; Gallant & Connell, 1997; Marcus & Owen, 1992; Marcus, Rossi, et al., 1992). It is interesting to notice that these factors were not associated with the adoption and maintenance of physical activity for Taiwanese family caregivers. On the other hand, factors such as *relationship with care-recipient* and *marital status*, which have not been investigated extensively and systemically in earlier Western research, were found to significantly contribute to the regular physical activity of family caregivers in Taiwan. Given these differences between the West and Taiwan, it would seem that cultural factors play important roles in the adoption and maintenance of physical activity for different populations.

**Factors related to self-efficacy.** A significant positive relationship was found between the level of caregivers' overall self-efficacy and the hours of physical activity
for the past 2 weeks, indicating that caregivers who spent more time in physical activity during the past 2 weeks were more likely to have a higher level of self-efficacy to engage in regular physical activity. This finding could be related to the fact that caregivers with prior physical activity experience may be better able to judge their likelihood of continuing to carry out regular physical activity. This prior physical activity experience may contribute to greater self-efficacy for caregivers.

However, there were no significant relationships between the level of caregivers’ overall self-efficacy and caregivers’ age, BMI (kg/m²), relationship to patient, religion, marital status, disease history, gender, the amount of time spent in caregiving, working hours, educational level, income, the amount of support caregivers received from other family members for caregiving, perception of physical activity, and health perception.

Factors related to perceived benefits. The level of caregivers’ overall perception of the benefits of regular physical activity was significantly and positively related to the number of hours employed outside the home per week, indicating that caregivers who worked more hours outside the home weekly tended to perceive more benefits of regular physical activity. Moreover, caregivers who thought that physical activity was good for their health showed a significantly higher level of overall perception of the benefits of regular physical activity than did those who had no idea about physical activity. Although these caregivers were more likely to perceive more benefits of regular physical activity, there was no relation between these demographic variables (e.g., working hours and perception of physical activity) and the stages of change of physical activity. A question remains about what factors contributed to caregivers’ ability to participate in regular physical activity after they have become aware of the benefits of regular physical
activity. There were no significant findings between the level of caregivers' perceived benefits and caregivers' age, BMI (kg/m\(^2\)), relationship to patient, religion, marital status, educational level, disease history, gender, the amount of time spent in caregiving, income, the amount of support caregivers received from other family members for caregiving, perceived health, and hours of physical activity for the past 2 weeks.

**Factors related to perceived barriers.** The level of caregivers' overall perception of the barriers to regular physical activity was significantly and positively related to the number of hours spent in providing care for the mentally ill patient per day and the number of hours employed outside the home per week, indicating that caregivers who spent more time in providing care for the patient daily and who worked more hours outside the home weekly were inclined to perceive more barriers to regular physical activity. Additionally, the level of overall perception of barriers was significantly and negatively related to caregivers' health perception, indicating that caregivers who felt their health status was poorer had a tendency to perceive more barriers to regular physical activity. These findings suggest that lack of time and perception of poor health status could be factors interfering with caregivers' participation in physical activity. This result is similar to existing U.S. data describing caregivers' physical activity and exercise behavior (Periard & Ames, 1993; Sisk, 2000). No significant findings were observed between the level of overall perception of the barriers to regular physical activity and caregivers' age, BMI (kg/m\(^2\)), relationship to patient, religion, marital status, disease history, perception of physical activity, gender, education, income, the amount of support caregivers received from other family members for caregiving, and hours of physical activity for the past 2 weeks.
In summary, according to the TTM, progressing from earlier stages to later stages depends on an increase in self-efficacy and perceived benefits and a decrease in perceived barriers; the pros of regular physical activity outweigh the cons, in essence. These postulations of the TTM, combined with the findings concerning factors that are associated with the TTM constructs in this study, imply that strategies for developing an effective physical activity program need to include these demographic factors and the TTM concepts in order to help individuals progress to later stages.

**Limitations of Study**

A few study limitations should be discussed. First, the study subjects represented a convenience sample of family caregivers from a psychiatric hospital in Tainan City. The results of this study cannot be generalized to physical activity patterns of family caregivers from other regions in Taiwan.

A second limitation is the use of self-reported physical activity data. Because self-reported physical activity data are likely to be less accurate than objectively measured and verified data, the level of overestimation or underestimation with which subjects completed the instruments for this study is unknown.

Third, the caregivers were asked to estimate their physical activity behaviors for the “past 2 weeks” and “past 6 months.” Therefore, it is possible that some recall bias may exist in this survey.

Fourth, the instruments used in this study are based on the culture and lifestyle of Western populations and may not be applicable to Taiwanese people. For example, in connection with the item "I will live longer if I exercise" from the Exercise Benefits Scale, most caregivers expressed the belief that longevity of life is predetermined by
one's fate. Thus, physical activity or exercise is seen as having no effect on the longevity of life.

Fifth, several items were limited by caregivers' conceptual understanding due to their low educational status, specifically such items as “I will prevent heart attacks by exercise,” “Exercise increases my muscle strength,” and “Exercise will keep me from having high blood pressure.”

Sixth, as noted previously, several questions from the Exercise Barriers Scale were not suitable to test “physical activity” for this study. Consequently, some of caregivers may have given less thought to answering these questions. This lack of thought may account for the lack of significant differences in these items.

Seventh, stage distribution results in this study reveal that the majority of caregivers \((n = 77)\) were in the action/maintenance stage. The other two groups consisted of only 9 and 22 caregivers, respectively. Thus, some caution is warranted in comparing results between these groups due to the unequal sample size.

Eighth, although the caregivers were provided the Examples of Vigorous and Moderate Activities selected from the Compendium, a few typical Taiwanese physical activities that caregivers reported were not included in the Compendium. These activities were the Chinese operas, imitating families hired for ceremonies to cry, roadside noodle selling, and chicken catching. The effect of such misclassification on the results is unclear.

Finally, owing to the cross-sectional design of this study, the causal relationship between the stages and the factors is unclear; also there is no consideration of physical activity behavior over the course of caregiving.
Implications for Nursing

Despite the study's limitations, several aspects of the research findings have important implications for nursing practice, research, and education.

Implications for Nursing Practice

The findings provide information regarding factors related to physical activity and regarding the applicability of the TTM to Taiwanese caregivers. Nursing professionals who have access to family caregivers could incorporate this information into intervention strategies aimed at increasing caregivers' physical activity. Examples might include developing caregivers' values and increasing their confidence about participating in regular physical activity, if caregivers are in the earlier stages (e.g., precontemplation or contemplation).

The findings that 71.3% of the caregivers engaged in regular physical activity (action/maintenance stage), whereas 20.4% had inactive lifestyles (precontemplation stage), combined with the finding that inactive caregivers were less likely to associate self-efficacy and health benefits with physical activity, suggest that there remains a need to communicate to inactive caregivers the benefits of regular physical activity and to increase their confidence about performing regular physical activity.

The finding that caregivers in the precontemplation or contemplation/preparation stages rated significantly lower scores in several items concerning self-efficacy and perceived benefits and higher scores in barrier items, as compared to caregivers in the action/maintenance stage (see Tables 8 and 10), provides useful data for developing interventions directed at increasing physical activity.
Implications for Nursing Research

The TTM, which has been used to describe the adoption and maintenance of physical activity in Western populations, only partially applied to the Taiwanese family caregivers in this study. However, results from this study complement the growing body of knowledge supporting the applicability of the TTM to Taiwanese caregivers. Moreover, findings provide some insight into the factors that are associated with the TTM and the adoption and maintenance of physical activity among Taiwanese caregivers. Since research on physical activity in Taiwan is relatively scarce, continued research is needed to identify the most effective theory-based physical activity interventions for evidence-based nursing practice in clinical and community settings (Robbins et al., 2001).

Implications for Nursing Education

The research topic of the TTM is still new in Taiwan. Therefore, the concept of an individual’s motivational readiness has not been established. In Taiwan, most programs related to health promotion are action-oriented and therefore ignore individual differences in motivational readiness. To offer better quality care in the future, it is important to encourage incorporation of the concept of motivational readiness into nursing curricula from basic nursing training to doctoral levels.

Recommendations

Recommendations for Future Research

Study design. The findings of this study are limited by a small, nonrandom sample from a local hospital in southern Taiwan. In order to analyze the entire TTM at
each stage, future studies, including a larger sample from a more geographically and socioeconomic diverse group, randomly chosen from more than one home care agency would provide a more representative pattern of family caregivers’ physical activity in Taiwan.

Future work could benefit from the inclusion of an objective measure of physical activity. If objective forms of measuring physical activity are not feasible, studies could include more than one form of physical activity self-report to ensure a comprehensive understanding of physical activity behaviors for caregivers in Taiwan.

As culture may impact the physical activity of the caregivers in this study, potential variables in future studies could include normative and/or cultural beliefs about the value of physical activity, such as filial obligation.

Complete model testing. Although this study offers some new insights regarding the applicability of the TTM to Taiwanese family caregivers, only three dimensions of the TTM were studied. Future research should examine the processes of change as well. The TTM is still in the theory development stage, as many studies are undertaken to understand how it operates in a variety of health-related contexts (Burbank & Riebe, 2002). Nevertheless, few studies have investigated all constructs from the TTM. Therefore, whole model testing is needed and can improve the precision of the TTM’s predictive ability.

Development of Eastern instruments and models. Although this study failed to support the hypothesis related to perceived barriers, the findings do highlight the importance of selecting instruments and models that are sensitive to cultural differences. Developing instruments more appropriate for use with Taiwanese people may allow for
the collection of more detailed and accurate physical activity information.

Stages of change results for physical activity in this study indicate that the majority of caregivers were in the maintenance stage followed by the precontemplation stage. Few subjects in this study were classified into the contemplation, preparation, or action stages. This is may be because the TTM was originally developed to explain adult smoking behavior, alcohol use, and drug addition in the West. Although it has successfully been applied to physical activity and exercise behavior among Western adult samples, the TTM simply may not be appropriate for the study of Taiwanese caregivers’ physical activity. If indeed stages of change for physical activity do exist for caregivers, perhaps different stages for Taiwanese caregivers may be more appropriate than those posited in the TTM. Perhaps, too, the conceptual descriptors contained within the Stages of Change for Regular Physical Activity Questionnaire may require modification. Before dismissing the TTM or refining the new measurement instrument, however, more work on physical activity and the TTM among Taiwanese caregivers is needed.

Although the Compendium was a useful reference for identifying examples of various types of vigorous and moderate activities, it has the disadvantage of excluding some typical Taiwanese activities. Therefore, the utility of the Compendium within a different culture should be investigated in the future.

Longitudinal study. It is recommended that prospective and longitudinal surveys be conducted to track the patterns of family caregivers' physical activity in order to more adequately determine the applicability of the TTM and the effects of caregiving on the relative activity of caregivers' lifestyles over time. For example, using a time frame of more than 6 months to define physical activity staging and investigating the seasonal
impact on physical activity are needed to further develop knowledge regarding how physical activity changes over time (Nigg, 2001).

Given the possible links between physical activity and other health behaviors, it would be interesting to explore if maintaining regular physical activity over time results in a reduced likelihood of adopting or continuing damaging behaviors, such as smoking, alcohol use, or unhealthy eating (Robbins et al., 2001). Such research might have the advantages of enhancing caregivers’ perceptions of the benefits of regular physical activity and providing information to those involved in physical activity promotion.

Recommendations for Intervention in Taiwan

Stage-matched interventions have been successful in increasing the adoption and maintenance of regular physical activity in previous Western studies. However, most programs promoting physical activity in Taiwan are designed for individuals who are highly motivated or already physically active, such as the Move for Health program. This new national health program is promoted through the Taiwanese government’s website, which has information and interactive software people can use to send Move for Health reminders to their love ones all around the world (Department of Health of the Executive Yuan of Taiwan, 2003). This program seems to lack ways to tailor intervention to the needs and interests of those who have little interest in starting to engage in physical activity. Although this study provides partial support for the hypothesized relation between concepts derived from the TTM, the conceptual framework provided by the TTM has the potential to provide the tailored quality that appears to have been lacking in previous interventions in Taiwan. Prior to adopting the
TTM with Taiwanese caregivers or Taiwanese individuals, however, additional research will be necessary.

Development of more successful interventions will help to reach the goal of increasing the level of physical activity in Taiwan. By doing so, the quality of life of the Taiwanese family caregiver population will be greatly improved, as the incidence and prevalence of conditions such as diabetes mellitus and heart disease decrease. From a broader perspective, because family caregivers play an invaluable role in the health care system in Taiwan, such interventions in caregivers’ health may ultimately have a positive impact on the entire health system in Taiwan.

Conclusions

This is the first study to examine whether constructs from the TTM are applicable to Taiwanese family caregivers relative to regular physical activity and to explore the factors that affect constructs from the TTM in Taiwan. Results suggest that the stages of change for physical activity were associated with self-efficacy and perceived benefits. There were no significant differences in the level of perceived barriers to regular physical activity across the different stages. This study provides partial support for the hypothesized relationships between constructs derived from the TTM. However, these TTM findings can be applied only to the family caregivers being examined in this study. Caution should be used in generalizing the results to other types of health behaviors in other populations, such as smoking and screen behaviors, rural and urban groups, or Western and Eastern populations.

The results also provide evidence for relationships between constructs from the TTM and some demographic variables such as age, marital status, relationship to patient,
perception of physical activity, the number of hours employed outside the home per week, the amount of time spent in caregiving, hours of physical activity for the past 2 weeks, and health perception. This study reveals that these demographic factors and cultural issues may play a critical role in physical activity behavior among Taiwanese family caregivers and need to be further investigated.
APPENDIX A

FAMILY CAREGIVER’S DEMOGRAPHIC CHARACTERISTIC QUESTIONNAIRE
1. Age: ____________

2. Body Mass Index: ____________ (kg/m²)

3. How many hours per day do you take care of the patient? _____ hour (s)

4. How many hours per week are you employed outside your home? _____ hour (s)

5. Gender:
   - Female ................................................................................................................... 1
   - Male ..................................................................................................................... 2

6. Relationship to patient:
   - Spouse ................................................................................................................ 1
   - Child .................................................................................................................... 2
   - Parent ................................................................................................................... 3
   - Friend .................................................................................................................. 4
   - Relative ............................................................................................................... 5
   - Other ................................................................................................................... 6
   - Specify: ____________

7. What is your religious preference?
   - Buddhist ............................................................................................................. 1
   - Catholic .............................................................................................................. 2
   - Christian ............................................................................................................ 3
   - None .................................................................................................................... 4
   - Other ................................................................................................................... 5
   - Specify: ____________
8. What is your current marital status?
   Married .......................................................... 1
   Divorced ....................................................... 2
   Never married ............................................... 3
   Widowed ...................................................... 4
   Separated ..................................................... 5
   Other ............................................................ 6
   Specify: ____________________________

9. What is the highest level of education that you completed?
   Less than senior high school ........................................ 1
   Senior high school graduate ...................................... 2
   Some college ...................................................... 3
   University graduate ............................................. 4
   Post graduate .................................................... 5
   Other ............................................................... 6
   Specify: ____________________________

10. What was the monthly income of you and your family for this past year before taxes?
   < NT$20,001 .................................................. 1
   NT$20,001-30,000 ........................................ 2
   NT$30,001-40,000 ........................................ 3
   NT$40,001-50,000 ........................................ 4
   > NT$50,000 .................................................. 5

11. How many family members assist you in caring for the patient during weekdays?
    None ........................................................... 1
    One person ................................................... 2
    Two persons .................................................. 3
    More than two persons ..................................... 4

12. How many family members assist you in caring for the patient on weekends?
    None ........................................................... 1
    One person ................................................... 2
    Two persons .................................................. 3
    More than two persons ..................................... 4
13. Do you have any diseases?
Yes .......................................................................................................................... 1
No .......................................................................................................................... 2
I don’t know ........................................................................................................ 3

14. Overall, would you say your health is?
Poor ....................................................................................................................... 1
Fair ........................................................................................................................ 2
Good ...................................................................................................................... 3
Very good .............................................................................................................. 4
Excellent ............................................................................................................... 5

15. What do you think about physical activity?
Male activity ....................................................................................................... 1
Waste time ............................................................................................................. 2
Good for health ..................................................................................................... 3
Other ..................................................................................................................... 4
Specify: __________________

16. In the last 2 weeks, how many hours of physical activity have you done?
______ hour (s)
APPENDIX B

STAGES OF CHANGE FOR REGULAR PHYSICAL ACTIVITY QUESTIONNAIRE
DIRECTIONS: Regular physical activity is any planned/routine/daily physical activity (e.g., tai chi, jogging, bicycling, swimming, sweeping floor, and clean temple) performed to increase physical fitness. Such activity should accumulate at least 30 minutes of moderate intensity physical activity throughout the day for more than 5 days of the week, or accumulate at least 20 minutes of vigorous intensity activity throughout the day at least 3 days a week (see EXAMPLES OF MODERATE AND VIGOROUS ACTIVITIES). It is not necessary to perform activity all in one session. Several 8- to 10-min sessions can be just as effective. Physical activity does not have to be painful to be effective but should be done at a level that increases your breathing rate and causes you to break a sweat.

Question:

Do you engage in physical activity regularly according to that definition?

No, and I do NOT intend to in the next 6 months. ...................................................... 1

No, but I intend to in the next 6 months. ................................................................. 2

No, but I intend to in the next 30 days. ................................................................. 3

Yes, I have been for LESS than 6 months. ............................................................. 4

Yes, I have been for MORE than 6 months. ............................................................ 5

Scoring:
1 = Precontemplation
2 = Contemplation
3 = Preparation
4 = Action
5 = Maintenance
APPENDIX C

EXAMPLES OF MODERATE AND VIGOROUS ACTIVITIES
Moderate Intensity

Home Activities
Carpet sweeping, sweeping floor
Sweeping garage, sidewalk, or outside of house
Cleaning, heavy or major (e.g., wash car, and windows)
Scrubbing floors, on hands and knees
Scrubbing bathroom, bathtub
Vacuuming
Multiple household tasks all at once
Moving furniture, household items
Occasional lifting of household items
Carrying boxes
Standing: packing/unpacking boxes
Walking
Walk/run: playing with child
Carrying small child
Child, elder, disabled adult care (only active period)

Sports
Tai chi
Tennis, doubles
Ping-pong
Golf
Badminton, social
Basketball, nongame
Bowling

Religious Activities
Clean temple or church
Spiritual dancing in temple or church
General yard at temple or church

Moderate Intensity

Lawn and Garden
Planting seedlings
Planting trees, gardening
Picking fruit/vegetables

Conditioning Exercise
Health club exercise
Slow cycling
Slimnastics, jazzercise
Going up and down from floor

Dancing
Twist jazz, tap, jitterbug
Ballroom (e.g., disco, folk, square, waltz, and slow dancing)

Occupation
Electrical work
Farming
Building road

Vigorous Intensity
Jogging
Running
Aerobic dance
Basketball, game
Fast cycling
Swimming
Tennis, singles
Rope jumping
Carrying groceries upstairs
Truck driving

Other
Specify: ______________
APPENDIX D

EXERCISE SELF-EFFICACY SCALE
DIRECTIONS: A number of situations are described below that can make it hard to stick to physical activity regularly. On the items below, please rate your degree of confidence that you can perform physical activity on a regular basis by recording in each of the blank spaces a number from 0 to 100 using the scale below.

<table>
<thead>
<tr>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot do at all</td>
<td>Moderately certain can do</td>
<td>Certain can do</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

(0-100)

1. When I am feeling tired. ___

2. When I am feeling under pressure from work. ___

3. During bad weather. ___

4. After recovering from an injury that caused me to stop exercising. ___

5. During or after experiencing personal problems. ___

6. When I am feeling depressed. ___

7. When I feeling anxious. ___

8. After recovering from an illness that caused me to stop exercising. ___

9. When I feel physical discomfort when I exercise. ___

10. After a vacation. ___

11. When I have too much work to do at home. ___

12. When visitors are present. ___

13. When there are other interesting things to do. ___

14. If I don’t reach my exercise goals. ___

15. Without support from my family or friends. ___

16. During a vacation. ___

17. When I have other time commitments. ___

18. After experiencing family problems. ___
APPENDIX E

EXERCISE BENEFITS SCALE
DIRECTIONS: Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by circling:

1 = Strongly Disagree (SD)
2 = Disagree (D)
3 = Agree (A)
4 = Strongly Agree (SA)

1. I enjoy exercise. 1 2 3 4
2. Exercise decreases feelings of stress and tension for me. 1 2 3 4
3. Exercise improves my mental health. 1 2 3 4
4. I will prevent heart attacks by exercising. 1 2 3 4
5. Exercise increases my muscle strength. 1 2 3 4
6. Exercise gives a sense of personal accomplishment. 1 2 3 4
7. Exercising makes me feel relaxed. 1 2 3 4
8. Exercising lets me have contact with friends and persons I enjoy. 1 2 3 4
9. Exercising will keep me from having high blood pressure. 1 2 3 4
10. Exercising improves functioning of my cardiovascular system. 1 2 3 4
11. Exercising improves the level of my physical fitness. 1 2 3 4
12. My muscle tone is improved with exercise. 1 2 3 4
13. I have improved feelings of well-being from exercise. 1 2 3 4
14. Exercising increases my stamina. 1 2 3 4
15. Exercising improves my flexibility. 1 2 3 4
16. My disposition is improved with exercise. 1 2 3 4
<p>| | | | | |</p>
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<tbody>
<tr>
<td>17. Exercising helps me sleep better at night.</td>
<td>1 2 3 4</td>
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<td>18. I will live longer if I exercise.</td>
<td>1 2 3 4</td>
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<tr>
<td>19. Exercising helps me decrease fatigue.</td>
<td>1 2 3 4</td>
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<tr>
<td>20. Exercising is a good way for me to meet with new people.</td>
<td>1 2 3 4</td>
<td></td>
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<tr>
<td>21. My physical endurance is improved by exercising.</td>
<td>1 2 3 4</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>22. Exercising improves my self-concept.</td>
<td>1 2 3 4</td>
<td></td>
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<tr>
<td>23. Exercising increases my mental alertness.</td>
<td>1 2 3 4</td>
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<tr>
<td>24. Exercise allows me to carry out normal activities without tiredness.</td>
<td>1 2 3 4</td>
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<tr>
<td>25. Exercise improves the quality of my work.</td>
<td>1 2 3 4</td>
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<tr>
<td>26. Exercise is good entertainment.</td>
<td>1 2 3 4</td>
<td></td>
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<tr>
<td>27. Exercise increases my acceptance by others.</td>
<td>1 2 3 4</td>
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<td></td>
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<tr>
<td>28. Exercise improves overall body functioning for me.</td>
<td>1 2 3 4</td>
<td></td>
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<tr>
<td>29. Exercise improves the way my body looks.</td>
<td>1 2 3 4</td>
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</table>

APPENDIX F

EXERCISE BARRIERS SCALE
**DIRECTIONS:** Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by circling:

1 = Strongly Disagree (SD)
2 = Disagree (D)
3 = Agree (A)
4 = Strongly Agree (SA)

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>D</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Exercising takes too much of my time.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. Exercise tires me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>3. Places for me to exercise are too far away.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>4. I am too embarrassed to exercise.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>5. It costs too much to exercise.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>6. Exercise facilities do not have convenient schedules for me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>7. I am fatigued by exercise.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>8. My spouse (or significant other) does not encourage exercising.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. Exercise takes too much time from family responsibilities.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>10. I think people in exercise clothes look funny.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. My family members do not encourage me to exercise.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12. Exercise takes too much time from family relationships.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13. Exercise is hard work for me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14. There are too few places for me to exercise.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>

APPENDIX G

INFORMED CONSENT
CONSENT

1. Background

You are being invited to participate in a study that intends to explore factors that affect family caregivers' readiness to do regular physical activity and to see if the U.S. idea regarding individual's readiness is useful with Taiwanese family caregivers relative to regular physical activity. The study is being conducted by Wei-Chen Tung. I am a graduate student in the College of Nursing at the University of Utah, USA.

2. Study Procedure

If you agree to be in this study, you will be asked to complete a questionnaire in your home that will take about 30-45 minutes. The questionnaire includes (1) Family Caregiver’s Demographic Characteristic Questionnaire, (2) Stages of Change for Regular Physical Activity Questionnaire, (3) Exercise Self-Efficacy Scale, (4) Exercise Benefits Scale, and (5) Exercise Barriers Scale. In order for me to understand if you are overweight, underweight, or about right for your height, you will be weighed and your height will be measured.

3. Risks

There are no physical risks associated with completing questionnaire or being weighed. There may be some inconvenience to you in spending the time necessary to complete questionnaire and to be weighed. You might feel uncomfortable expressing your opinions to me through the questionnaire. In addition, you may possibly feel embarrassed at being weighed on a scale, but I will not give this individual information to anyone.

4. Benefits

You will be contributing toward a better understanding of the factors that affect family caregivers’ readiness to do regular physical activity and the usefulness of the U.S. idea regarding individual’s readiness with Taiwanese family caregivers relative to regular physical activity. However, there is no direct benefit.

5. Alternative Procedures

If, for some reason, you feel uncomfortable or embarrassed during the study, then you can rest or stop. This study is voluntary. You may choose to end your participation at any time. There is no alternative procedure to this project and you may
choose not to participate.

6. Confidentiality
All of your records and other information obtained will be kept strictly confidential and secured in a locked drawer by the principal investigator. There will be no personal identifiers in the data analysis. You will not be named in any publication or presentation.

7. Person to Contact
If you have questions about the study or about your participation, you may call Wei-Chen Tung, RN, at 0930036952. This is a 24-hour telephone number.

8. Institutional Review Board
If you have questions regarding your rights as a research subject, or if problems arise that you do not feel you can discuss with the investigator, please contact the Institutional Review Board Office, located in Salt Lake City, Utah, USA at 002-1-801-581-3655.

9. Voluntary Participation
Your participation in this study is completely voluntary. You may withdraw at any time without negative consequences. Such a decision will not influence the psychiatric care to which your mentally ill family member is otherwise entitled.

10. Unforeseeable Risks
The research may involve risks that are currently unforeseeable, but this is unlikely.

11. Right of Investigators to Withdraw Subjects
The investigator has the right to withdraw your participation without asking you.

12. Costs to Subjects
There is no cost to you or your National Health Insurance for your participation in this study.

13. New Information
Any significant new findings developed during the course of the research will be provided to you.
14. Number of Subjects
   There will be 113 caregivers in this study.

15. Consent
   I have read the foregoing and my questions have been answered. I desire to
   participate in this study and accept the benefits and risks. I understand that a copy of the
   consent document will be given to me.

   _______________________________  _______________________________
   Signature of Participant        Date

   _______________________________  _______________________________
   Signature of Witness           Date
APPENDIX H

MODIFIED QUESTIONS
1. When I am feeling depressed.\textsuperscript{a}
2. When I am feeling anxious.\textsuperscript{a}
3. I enjoy exercise.\textsuperscript{b}
4. My physical endurance is improved by exercising.\textsuperscript{b}
5. Exercising improves my self-concept.\textsuperscript{b}
6. Exercise allows me to carry out normal activities without tiredness.\textsuperscript{b}
7. Exercise improves the way my body looks.\textsuperscript{b}
8. Exercise takes too much time from family responsibilities.\textsuperscript{c}
9. Exercise takes too much time from family relationships.\textsuperscript{c}

\textbf{Note.} \textsuperscript{a}The original questions from the Exercise Self-Efficacy Scale. \textsuperscript{b}The original questions from the Exercise Benefits Scale. \textsuperscript{c}The original questions from the Exercise Barriers Scale. \textsuperscript{*}The modified questions.
References


