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Effects of Physical Activity and Religiosity on Psychophysiological Reactivity in an Aging Population

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EFFECTS OF PHYSICAL ACTIVITY AND RELIGIOSITY ON PSYCHOPHYSIOLOGICAL REACTIVITY IN AN AGING POPULATION

by

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ABSTRACT

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Physical activity is known to offer health benefits. Additionally, research has linked religious involvement with health. Psychophysiological reactivity has links to coronary heart disease. This study examines the relationship between physical activity and religiosity in light of psychophysiological reactivity. The sample included 75 subjects, with a mean age of 71.7 (SD = 6.11), with no history of cardiac incident. Religiosity was measured with the Religious Orientation Scale (ROS). Physical activity was assessed utilizing the Typical Week Physical Activity Scale. Psychophysiological reactivity was measured by blood pressure, heart rate, and self-report anger ratings in response to interpersonal challenge. Regression predicting reactivity, including ROS, total metabolic equivalence (MET) minutes, and interaction of the two resulted in significant prediction of systolic blood pressure change, F (3, 74) = 3.33, p = .024. Analyses suggest relationships between reactivity and religiosity are not mediated by

physical activity. Indicating ROS may operate more influentially over prohibited than proactive behaviors.

(124 pages)

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CHAPTER I

INTRODUCTION

According to recent demographic information, the average age in the United States is increasing. In 1992, the 55-and-over age group comprised 20% of the population and is expected to increase to 30% by the year 2020, while the 65-and-older population is expected to boom from 12.6% in 1992 to 16.6% by 2020 (van Sickle, Hersen, Simco, Melton, & van Hasslet, 1996). The aging of this group is coupled with increasing rates of sedentary adults across the nation, in addition to health concerns accompanying aging.

According to the U.S. Department of Health and Human Services (U.S. DHHS, 1996), over 60% of adult Americans are not regularly physically active and 25% are completely sedentary. The second figure rises astoundingly when adults age past 60. Thirty-eight percent of men 75 years and older and 55% of women in this age group are completely sedentary (Christmas & Andersen, 2000). Typically, the less physically active one is the more likely she/he is to suffer negative health consequences. It is notable to mention that many of these negative health outcomes are preventable. Physical activity is a modifiable risk factor for a multitude of negative health outcomes (van der Bij, Laurent, & Wensing, 2002).

The necessity of physical activity is so prevalent that the Surgeon General's office has published a prescription for certain levels, frequency, and duration of physical activity for United States citizens in order to benefit the collective health of the nation (U.S. DHHS, 1996). Additionally, there is a significant volume of data to

support the protective effects of physical activity. Regular physical activity is inversely related to all –cause mortality, mortality from coronary heart disease (CHD), risk of developing diabetes mellitus, hypertension, and colon cancer in particular, in addition to overwhelming physical and mental health benefits in general (Seefeldt, Malina, & Clark, 2002). Further, regular physical activity is specifically recommended for older populations; physical activity may "ameliorate disease and delay decline in function in the geriatric population" (Christmas & Andersen, 2000, p. 318).

Another possible mechanism by which individuals may improve life quality and health outcomes lies in the area of spirituality, specifically religiosity. In the research literature, religiosity is typically referred to as a gauge of religious or spiritual involvement defining not whether an individual is religious, but how that religious involvement is implemented in an individual's life (Payne, Bergin, Bielema, & Jenkins, 1991). "Numerous studies have reported that religiosity, or one of the dimensions of religiosity, has a positive impact on mental health…there is also growing scientific evidence for a positive link between religiosity and physical health" (Ferraro & Albrecht-Jensen, 1991, p. 193). There is recent evidence that holds that religious beliefs/practices may have an association to longevity as well as other positive health outcomes (Clark, Friedman, & Martin, 1999).

According to a 1999 Gallup poll, 86% of Americans report a belief in God, and 60% view religion as very important in their lives (Newport, 1999). Further, older adults in the United States belong to more religious groups than all other social groups combined (Koenig, 1993) and have higher levels of religious commitment and

participation than any other age group (McFadden, 1995). Religiosity is a multifaceted construct that is interrelated with many elements of the lives of Americans. The importance of religiosity has been highlighted by a recent insurgence of focus on the mind-body connection; specifically how nonphysical variables can influence health (McIntosh & Spilka, 1990). This leaves the general public searching for answers regarding how religiosity can benefit physical and psychological health.

A number of studies have documented the positive physical and mental health benefits of physical activity in older adult populations. Separately, a number of studies have assessed the interaction of religiosity with physical and mental health in older adult populations. However, no studies currently exist that examine the possible collective effects of physical activity and religiosity as predictors of reactivity to stress. Consequently, there is little information available about possible concomitant health benefits of physical activity and religiosity in light of psychophysiological reactivity. This problem is significant due to the size of the aging population within the United States accompanied by data indicating that older adults are more adherent to religious practices and are generally less physically active than younger adults. Since there is separate evidence to support the positive effects of religiosity and physical activity on levels of reactivity, investigation combining these two is critical.

CHAPTER II

LITERATURE REVIEW

There is an intriguing possibility of combining physical activity level, a physiologically demonstrated mechanism for improving health, with religiosity, a construct hypothesized to be linked to health. Many possible relations exist and the following literature will provide background information pertaining to physical activity and religiosity. In addition, current research foundations will be presented in order to cultivate hypotheses regarding the relationship of physical activity, reactivity, which has also been linked to health outcomes, and religiosity in an older adult population.

Benefits of Physical Activity

Evidence demonstrating the importance of physical activity as it relates to health outcomes is quite extensive, and physical inactivity is considered a major health problem within the United States. Reports regarding physical activity and health have been published by organizations such as the U.S. Surgeon General, the Centers for Disease Control, National Institutes of Health, and the American Heart Association. The epidemic of inadequate physical activity has prompted the American College of Sports Medicine to propose lifestyle changes that encourage individuals to become more physically active. Specifically, the proposal suggests that all adults should engage in moderate physical activity for a minimum of 30 minutes on most if not all days of the week (Pollock et al., 1998). These recommendations resulted from a consensus from the five groups listed above (Blair & Jackson, 1998). Regardless of the national public

health agenda to promote physical activity and the plethora of articles and reports in the popular media detailing benefits of physical activity, the public seems to be ignoring such information as the rate of sedentary individuals is higher than ever (Balady, 2002; Rutheford, Corbin, & Chase, 1992).

People who are regularly physically active reduce their risk of dying from CHD by about 50% and an estimated one third of deaths from CHD in the United States are attributable to insufficient physical activity (Powell & Pratt, 1996). These findings are of particular interest because cardiovascular diseases have been the most common cause of death in industrialized nations for the past 50 years (Gorenczny, 1995).

Physical activity has been found to exert beneficial effects on many biological functions and disease processes including the above-mentioned cardiovascular diseases as well as hypertension, glucose and insulin metabolism, blood lipids and lipoprotein levels, bone density, aging, obesity, and longevity (Curtis & Russell, 1997). Incidence and prevalence of Type 2 Diabetes, which is currently growing at epidemic proportions within the United States, is inversely related to physical activity (DiPietro, 2001). Lowered risk for stroke, the third leading cause of death in the United States (Perle, 1996), has also been proven to be associated with physical activity (Lee & Paffenbarger, 1999). Obesity, which is linked to sedentary lifestyle patterns, has been found to increase the risk of several types of cancer, namely: breast, colorectal, endometrial, prostate, kidney, and gall bladder (Seefeldt et al., 2002). More specifically, associations have been drawn between physical activity and reduced breast cancer risk in women through effects on endogenous hormone metabolism, body mass,

energy balance, and immunity (Verloop, Rookus, van deer Kooy, & van Leeuwen, 2000).

The benefits of physical activity also enter into the psychological realm including positive effects on cognition and normalization of the brain's stress response (Akande, van Wyk, & Osagie, 2000). Certain forms of physical activity have been found to decrease levels of anxiety and depression, which accompanies findings that suggest that exercise positively affects mood (van Sickle et al., 1996). Exercise, a form of physical activity, can aid in the development of individual identity, self-esteem, and feelings of competence (Akande et al.), which are likely to have positive links to mental health. Physical activity is also thought to contribute to higher levels of life satisfaction, a fairly comprehensive representation of psychological health (Clark, Long, & Schiffman, 1999). Finally, participation in physical activities is inversely related to self-perceived cognitive age for adults, which could be most salient for older adults.

The outcome data from physical activity studies has typically reported very positive effects on health outcomes. Intervention techniques have prescribed specific plans for physical activity with the intent to improve physical activity frequency to determine if it has an effect on the health of the individual. For example, in 1977, De Vries set out to determine if the effects of aging could be reversed through a six week intervention. This study found that many physical characteristics of aging could be reversed such as in blood pressure reduction (as cited in Akande et al., 2000).

Physical activity has often been the focus of study for researchers interested in aging populations and has been found to be beneficial for individuals of all ages

(Everard, Lach, Fisher, & Baum, 2000). Consequently, physical activity and its interaction with health have particular implications for elderly populations. Health-related fitness starts to decline in various bodily systems after about age 35; at age 75, all physical activity tends to decline (Goreczny, 1995). Activity in this population often dwindles and 80% of elderly people have at least one chronic health problem such as diabetes, hypertension, cardiovascular difficulty, or arthritis (King, 1991), which may hinder their capacity to be physically active. Complaints that begin as minor such as sleep disturbances, digestive problems, aches and pains, and general lethargy are worsened by previously mentioned chronic health problems and a sedentary lifestyle (Myers et al., 1999). Consequently, habitual physical activity participation sometimes presents a problem for older adults. It may be difficult for them to stay or become physically active due to chronic health limitations, yet lack of physical activity may worsen or intensify health problems.

Findings associated with the aging process suggest that there is a change in body composition, a loss of muscle mass (sarcopenia), strength, and an increase in body fat (Christmas & Andersen, 2000). Yet, the known positive effects of participation in physical activity specifically for the elderly can lead to improvements in body composition, diminished falls, increased strength, reduced arthritis pain, reduced risk for diabetes and coronary artery disease, improved longevity (Limacher, 1994), bone loss, hip fracture, and can slow the rate of functional decline (DiPietro, 2001). Reduced arthritis pain is especially beneficial to those who have osteoarthritis, a disease affecting 40 million Americans (Andersen-Parrado, 1999). Noteworthy are the effects of

exercise on cardiac function in the elderly as they can have the potential to reduce the risk of death from cardiac events (Limacher, 1994).

Vigorous exercise interventions have been found to have particularly positive results in older adult populations. Clark, Long, and Schiffman (1999) studied how exercise effects cognitive age, which consists of how young the individuals felt and perceived themselves to be. This 1999 study found that women 65 and older who were the most frequent vigorous exercisers were significantly cognitively younger than their walking and sedentary counterparts. When done vigorously, a variety of physical activities aid in controlling stress, tension, and rejuvenating the body and spirit (Akande et al., 2000). A high-intensity resistance exercise intervention was completed with 100 elderly individuals ages 72 to 89, with 88 requiring devices to aid in walking (Fiatarone, O'Neill, & Ryan, 1995). In addition, 66 of them had fallen in the past year; consequently, the finding that this exercise counteracted muscle weakness and frailty demonstrates that physical activity is beneficial even to very aged and frail individuals (Fiatarone et al.).

Physical activity studies in older adult populations have addressed much more than physiological benefits. Van Sickle et al. (1996) completed a comprehensive review of physical activity studies done to determine how physical activity affected cognitive functioning. Looking at studies done from 1966 to 1993, this group of researchers found that there had been various effects of exercise on cognitive functioning such as improved word fluency, improved total recall, improved verbal memory, and improved working memory. In addition, physical activity has been linked

to improvements in memory, attention, and reactivity. Physical activity is hypothesized to counter the decline in cardiac function related to age by decreasing brain hypoxia, which has been shown to increase with cardiac decline and negatively affect cognitive function (DiPietro, 2001).

Self-rated health has been another subject of physical activity studies. In 1973, DeVries and Adams found that physical activity has an effect on decreasing anxiety and depression. This intervention involved walking as the physical activity component, finding that a 15-minute walk produced more relaxation than medication designed to produce such a result (as cited in Akande et al., 2000).

As mentioned above, other important benefits of exercise for older adults found in the literature lie in the psychological and cognitive realms. It has been extensively documented that physical activity can improve quality of life, which is linked to psychological health, for adults of all ages and conditions of health (Seefeldt et al., 2002). Activities that are physically demanding have been associated with higher levels of functionality (Everard et al., 2000). Functionality, or functional capacity (Ruchlin & Lachs, 1999), is an important topic when looking at health status of the elderly, including various capacities such as self-sufficiency and mobility. Self-sufficiency is linked to the concept of self-efficacy, which is thought to be associated positively with self-rated health and depression in an older sample (Parkatti, Deeg, Bosscher, & Launer, 1998). In a 1977 study involving physical activity, elderly people reported improvements in the areas of self-esteem, body concept, family relations, memory, concentration, energy, sleep quality, and sexual relations (Akande et al., 2000). Each of

the aforementioned psychological variables reflects an interaction of physical and mental state, presenting itself when physical activity is involved. Consequently, physical activity involvement with older adults, which is controllable by the individual, may operate to positively influence psychological variables that are less concrete.

In general, physical activity exerts positive effects on both physical and mental health for individuals of all ages. Physical activity typically refers to amount of physical exercise (Ekelund et al., 2001) or any bodily movement that increases resting energy expenditure (Gauvin & Spence, 1995). Mixed findings have shown that when comparing physical activity to fitness (Ekelund et al.), both constructs are uniquely revealing. Fitness is more specifically defined as "maximal aerobic capacity adjusted for body size and composition, and is an integrated measure of cardiorespiratory and neuromusculo-skeletal function, oxygen transport and delivery, and psychological drive" (Erikssen, 2001, p. 571).

Interestingly, these constructs are intimately related in that the primary method to increase physical fitness is to participate in physical activity. The links between CHD and physical fitness are stronger than such links between CHD and physical activity (Erickssen, 2001). Estimated exercise capacity, an indication of physical fitness has been found to be inversely related to mortality from cardiovascular diseases and later mortality in general (Balady, 2002). Consequently, as physical fitness increases, the risk of dying from cardiovascular-related illness declines significantly. Physical fitness measurement is often assessed more directly through objective physiological means, whereas physical activity assessment is more likely to employ self-report

measures, which are inherently more subjective. In addition, fitness has been indicated to have genetic links (Erikssen, 2001). In addition among older adults, fitness has strong genetic components in light of flexibility, balance, strength, and speed (DiPietro, 2001). Yet, it is hypothesized that genetics account for less variation in fitness than environmental influences, that is, physical activity (Blair, Cheng, & Holder, 2001).

Consequently barring inaccurate reporting often encountered with physical activity evaluation, fitness is not directly paralleled by physical activity level. In addition, fitness is composed of a set of variables beyond the aforementioned habitual physical activity and heredity, but is also influenced by age, sex, and medical status, which are variables not always controlled by the individual (Balady, 2002).

Fitness emerges as a more accurate predictor of future health outcomes, yet is also more difficult to assess. With physical activity level as a more accessible measure, many are seeking a bridge between reportable physical activity levels and actual physical fitness. Consequently, physical fitness can be estimated by utilizing metabolic equivalents (METs). METs are used to estimate the amount of physical fitness according to the METs for the amount of physical activity an individual engages in (Balady, 2002). For example, one minute of walking at a moderate pace is equal to 3.0 MET minutes. Finally, it should be noted that the American College of Sports and Medicine holds that the quantity and quality of exercise recommended for improved fitness is higher and more intense than the levels of physical activity that can be beneficial to health in general (Pollock et al., 1998). However, significant health benefits can be obtained by simply evolving from a sedentary to more physically active

lifestyle. Specifically, older individuals can receive substantial health benefit from activity that increases their daily energy expenditure, but is not significant enough in intensity to increase fitness. Consequently, a measure of physical activity rather than fitness may be more salient for older adult populations.

Benefits of Religiosity

Throughout history, many cultures have looked to religious and spiritual involvement in an effort to understand and explain health and disease (Thoresen & Harris, 2002). Yet, such linkages, although hypothesized to exert some effect, either positive or negative over a long period of time, still fail to be well explained. The long-standing controversy regarding the role of spiritual and religious beliefs in health has spurred publication of 350 articles regarding physical health and religious involvement, along with publication of 850 articles in the area of mental health and religious involvement (Sloane & Bagiella, 2002) in search of more definitive, scientific answers regarding the relationship of religion and health.

Recently there have been many convincing studies to support a relationship between heath and religious involvement (Dull & Skokan, 1995). These relationships have been studied utilizing a wide range of health outcomes including heart disease, hypertension, stroke, cancers, self-rated health, physical disability, mortality risk (Ellison, 1998), cirrhosis, and emphysema (Thoresen & Harris, 2002). For example, studies of the effects of religiosity on hypertension have indicated that "the greater the level of religiosity, the lower the blood pressure" (Levin, 1994, p. 1477). The

relationships above are especially evident in middle-age to older adults and are extremely complex in that the possible causal mechanisms are currently not well specified.

The mechanisms by which religiosity could effect health have been conceptualized in a myriad of ways. A variety of models have attempted to elucidate the potential link between spiritual beliefs and health outcomes. Due to the lack of empirical knowledge in this area, models should be considered concurrently with potential flaws and be viewed as evolving conceptualizations of the relationship between health and spiritual or religious involvement (Thoreson & Harris, 2002). The first mechanism posits that religiosity may influence behaviors and personal lifestyles that affect overall health (Ellison, 1998; Ferraro & Albrecht-Jensen, 1991). The mechanisms that may influence health behaviors, lifestyle recommendations, and religion, have obvious physical and psychological health implications. For example, religiosity has been found to reduce destructive health behaviors (Ferraro & Albrecht-Jensen) by discouraging risk-taking behaviors, and molding lifestyle decisions in ways that may reduce stress (Ellison). This mechanism is exemplified by the view that "the body is a temple of the Holy Spirit…so glorify God in your body" (Dull & Skokan, 1995, p. 56).

Religion is hypothesized to affect health by acting as a means for social support (Clark et al., 1999; Ellison, 1998; Ferraro & Albrecht-Jensen, 1991; Helm, Hays, Flint, Koenig, & Blazer, 2000; Koenig, 1993; Koenig et al., 1997). This potential mechanism operates beneficially by providing support to others and being supported by others

within one's religion or religious group (Koenig et al.). Social support also exists within religious communities, providing members with an outlet to reduce feelings of isolation, and helps to establish a sense of belonging (Clark et al., 1999). The sense of belonging that religious involvement fosters is often referred to as social integration and is thought to promote intimacy and link the individual to larger social institutions (Johnson, 1995). Social support mechanisms offer assistance through formal channels (i.e., pastoral counseling, gifts of food, and housing options) as well as through more informal means of companionship and spiritual support (Ellison, 1998; McFadden, 1995).

Evidence that religious cognitions and behaviors are valuable coping resources introduces another mechanism connecting religion and health (Ellison, 1998; Helm et al., 2000). Studies associating religiosity with heightened coping ability are particularly interesting. People lacking coping skills tend to exhibit excessive responses to stress and thus increase their risk of cardiovascular disease (Clark et al., 1999; Dull & Skokan, 1995). Consequently, religious adherents find it easier to cope due to the belief in a higher power and acceptance that control in a variety of situations is often impossible, aiding those individuals in handling stressful situations in a less reactive manner (McIntosh & Spilka, 1990). Additionally, religion may be used as a coping method when individuals are faced with particular health problems (Dull & Skokan; Koenig, 1993; Levin & Chatters, 1998; Levin & van der Pool, 1991), bereavement, and unexpected calamities (Ellison, 1998).

Psychological resources associating religiosity with increased self-esteem and

self-efficacy (Ellison, 1998) demonstrate the fourth method by which religion could influence health. Religious involvement is hypothesized to lead to positive psychological outcomes through reduction of the impact of social stressors (Ellison, Boardman, Williams, & Jackson, 2001), and by providing individuals with self-identity by allowing for exploration of different roles (Johnson, 1995; McGuire, 1993). Theodicy, or ability to assign meaning to life situations, may alter the psychological perceptions of religious adherents, allowing them to view the world as more controllable because of previous assignment of meaning and order to events of life (Dull & Skokan, 1995; Idler, 1987). Additionally, many religious teachings foster optimistic attitudes and acknowledge that lifestyle variables including beliefs, emotions, and behaviors exert influence over disease risk and health outcomes (Thoresen & Harris, 2002). It has been found that when faced with illness, pessimistic individuals worry and fear, which can hinder ability to obtain timely treatment (Dull & Skokan, 1998; Levin & van der Pool, 1991). Other psychologically mediated mechanisms connecting religiosity with health are mental processes involved with controlling bodily functions such as pain or amount of bleeding (Dull & Skokan).

The final mechanism lies in the area of aspects of ritual religious activity. The repetitive nature of prayer or meditation, ritualistic religious activities, benefit health through lowering blood pressure and positively influencing psychoneuroendocrine function as a result of experiencing positive emotions (Helm et al., 2000). Some religious practices may lead to a psychoimmunological response through expression of certain emotions, either negative or positive (Dull & Skokan, 1995; Ellison, 1998). For

example, "involvement in ecstatic or cathartic worship services may promote mental and physical health" (Ellison, p. 693). This concept is further demonstrated by studies that show how beliefs and attitude patterns may be influential on physical outcomes.

As evidenced by the multiple possibilities for connections between religiosity and physical and mental health, it is evident that the relationships are complex. Also multifaceted are the modes researchers have utilized to measure level of religiosity and its varied dimensions. Some of these measures include religious function attendance (Dull & Skokan, 1995; Koenig et al., 1997), level of practice (Ferraro, Albrecht-Jensen, 1991), frequency of prayer, and frequency of watching/listening to religious broadcasting (Koenig et al.). Additionally, other modes of measuring religiosity include Bible reading and stories of healing (Arcury, Quandt, McDonald, & Bell, 2000), level of commitment (Payne, Begin, Bielema, & Jenkins, 1991), and religious involvement (Idler, 1987). Finally, another measure of religiosity, financial giving, is thought to be indicative of sincere faith (Neuman & Chi, 1999).

A particularly important measure of religiosity has been Allport and Ross's (1967) Religious Orientation Scale (ROS), which measures extrinsic/intrinsic perspectives of religious commitment. It is a reliable indicator of what degree religious values are incorporated into everyday life and functioning (Commerford & Reznikoff, 1996; Koenig, George, & Petersen, 1998; Koenig, Moberg, & Kvale, 1998; Payne et al., 1991). Intrinsic religiosity is thought to characterize an individual who internalizes religion completely, carrying it over into all aspects of their self and life (Kirkpatrick, 1989; Koenig, Moberg, & Kvale, 1998). Specifically, intrinsic individuals are thought

to refer to religion as, "the master motive with all aspects of life referenced to it" (McIntosh & Spilka, 1990, p. 169). The intrinsically religious person lives by principles (Commerford & Reznikoff, 1996), and is considered to be more genuinely religious or spiritual. Extrinsic individuals are characterized by a more superficial commitment (Koenig, Moberg, & Kvale) and use religion for comfort and social convention (Donahue, 1985) or as a means to other ends (e.g., economic gain or status). Further, extrinsically religious individuals approach religion through a self-serving, utilitarian viewpoint (Kirkpatrick, 1989).

Increasingly, there is evidence that religion has specific benefits for the health of older adults (Krause, 1998). The majority of elderly Americans utilize prayer and their faith in God to deal with loneliness, anxiety, tension, hopelessness, and depression (Koenig, 1993). Consequently, two major issues are revealed by research of the health benefits of religiosity on older populations. First, religion becomes more important as people age, possibly because of internal existential life battles. Second, elderly people are more likely to need to use religion as a coping mechanism because of health concerns as well as death of family members and friends. It was found in a telephone interview that 89% of older adults agreed or strongly agreed that God watches over them and answers their prayers (Koenig).

Additionally, higher levels of religious involvement has been found to relate to lower levels of functional disability and depression (Idler, 1987; Thoresen & Harris, 2002). Finally, private religious activity is thought to serve as a protective effect against mortality in an elderly population (Helm et al., 2000). Outcome findings have

shown that greater religiousness is associated with lower levels of functional disability and lower levels of depression in older participants in the Yale Health and Aging Project (Idler). Similarly, Levin and Chatters (1998), when comparing three national studies in the area of religious involvement and older adults found that organizational religiosity has positive effects on health. They stated that both nonorganizational religiosity and organizational religiosity are generally associated with both physical and psychological well being.

A recent study conducted by Helm and colleagues (2000) employed a diverse sample of people 65 and older. Private religious activity was assessed along the dimensions of prayer, meditation, and Bible reading. Physical health variables included self-rated health, chronic conditions, impaired daily activities, health practices, and social communications. Results showed that private religious activity was three times more likely to be present in women, and private religious activity provided a protective effect against mortality. Additionally, private religious activity can be likened to intrinsic religiosity through likelihood to engage along in religious practices for one's self (Commerford & Reznikoff, 1996). A longitudinal study done by Clark et al. (1999) examined data from Terman's 70-year life-cycle study. They found that for men, religion had only a slightly inverse relation to mortality, but for women, there was a 16% lower mortality risk for those who were more religious.

Studies specifically addressing intrinsic and extrinsic differences as measured by the ROS have offered insight into the relationship between religiosity and health. Koenig, Moberg and Kvale (1998) conducted a study resulting in diverse outcomes

related to religious activity and intrinsic orientation. Level of religious activity and intrinsic orientation were lower in patients with cancer, chronic anxiety, depressive symptoms, and those who smoked and who consumed moderate to large amounts of alcohol. Results also indicated a high frequency of church attendance among this sample, and a 72% daily rate of prayer. Social support aspects of religion were strong with 4 out of 5 of the subject's closest friends coming from church. Many of these individuals also reported positive experiences related to religion and that God helps prevent loneliness.

Many studies have addressed the possible link between religiosity and psychological well being. Koenig (1993) cited a study of 850 hospitalized older patients and 161 younger hospitalized patients. It was found that religion buffered both groups against stress of hospitalization and illness. This effect was exaggerated for older men with severe illness who experienced a decreased level of depressive symptoms if they used religion to cope. In a closely related study involving ill older patients who were screened and diagnosed with depressive disorder, results indicated that intrinsic religiosity was positively related to time in remission (Koenig, George, & Petersen, 1998). Private religious activity and church attendance were not. Consequently, individuals highest in intrinsic religiosity are less likely to suffer from depression and generally have a shorter recovery time from depressive disorder when compared to extrinsic, proreligious and nonreligious groups (Koenig, 1993).

Although most findings indicate religiosity having a protective effect on health, there are studies that have not found this relationship. Dull and Skokan (1995) state that

religion could contribute to self-devaluation, control by others, and stress from noncompliance with religious beliefs. A study looking at different types of religious affiliation by Ferraro and Albrecht-Jensen (1991) found that conservative religious affiliation is more likely to be linked to poor health status. These people also are more likely to be of lower socioeconomic status (SES), which may account for a portion of the findings. However, when researchers controlled for SES, a negative effect of conservative religious affiliation was still evident. Finally, it has been hypothesized that religious involvement may exacerbate some forms of stress, by allowing negative attributions to be made to behaviors that are not endorsed by religious norms. This attribution, whether correct or not, may result in feelings of guilt, shame, stigmatization, condemnation by religious leaders, and out of proportion feelings of responsibility for adherents (Ellison et al., 2001).

In reviewing the literature, Levin and van der Pool (1991) found that for certain groups such as Jewish individuals, there is an increased risk for heart disease when comparing them to Protestants, for whom religiosity shows an inverse relationship with heart disease. Other such group comparisons exist in the research literature. For example, studies show that both Latter-day Saints and Seventh-Day Adventists prescribe specific rules for health behaviors, and these rules seem to promote general good health status (Dull & Skokan, 1995). In contrast, some religious groups such as Christian Scientists discourage certain types of medical treatment, reducing positive health outcomes (Ferraro & Albrecht-Jensen, 1991).

Psychophysiological Reactivity

The research literature indicates that stress has negative implications for health. It is thought that stress operates to suppress immunological functioning (McIntosh & Spilka, 1990). Stress is not only common; it often cannot be avoided in daily life. Because stress is implicated generally in health, it is important to identify how stress is handled. The need for control is specifically thought to be an important component of the physiology of stressful responding. Consequently, when thinking of individuals who are at risk for demanding control over sometimes uncontrollable situations, the Type A behavior pattern comes to mind.

Early research suggested that Type A behavior, broadly defined, was a significant risk factor for CHD (Booth-Kewley & Freidman, 1987). Subsequent studies have focused more specifically on the hostility component of Type A as being most toxic. When data from the Western Collaborative Group Study were reanalyzed, only hostility emerged as a significant independent predictor of heart disease (Hecker, Chesney, Black, & Frautschi, 1988). Dembroski, MacDougall, Costa, and Grandits (1989) reexamined structured-interview ratings of Type A behavior from the Multiple Risk-Factor Intervention Trial and found that ratings of potential for hostility were associated with subsequent heart disease. Type A ratings alone were not significantly related to subsequent heart disease, and neither were other aspects of the Type A behavior pattern. A meta-analysis of 45 studies concluded that hostility and chronic anger were independent risk factors for the development of CHD and premature mortality (Miller, Smith, Turner, Guijarro, & Hallet, 1996).

If hostility does predict CHD, then it is important to investigate possible physiological mechanisms that could explain this relationship. The reactivity hypothesis offers one possible explanation for the relation between psychological variables and disease outcomes (Krantz & Manuck, 1984). The reactivity hypothesis proposes that heightened cardiovascular and neuroendocrine responses to stressful stimuli may exacerbate disease processes. It is believed that hostile responses to potential stressors initiate increases in heart rate, blood pressure, and stress-related hormones along with the release of free fatty acids from triglyceride storage. This exaggerated reactivity then initiates and quickens the development of coronary atherosclerosis and subsequent symptoms of CHD through several mechanisms including injury to the endothelium, increased levels of circulating lipoproteins that provide raw material for atherosclerotic plaque formation, and exaggerated blood pressure responses to challenge (Krantz & Maunuck).

Strong support from a variety of sources including animal and human research suggests that the reactivity hypothesis has merit. In animal studies involving rats, mice, and dogs, exposure to stressors such as territorial conflict and disruptions in social status have been shown to produce exaggerated stress-induced responses, which preceded the development of sustained high blood pressure (McNeilly & Andersen, 1996). Human research in the same area has also been supportive. Research using hostility measures generally indicates that hostile individuals are more prone to exaggerated psychophysiological reactivity responses (Hardy & Smith, 1988). For example, subjects with high scores on the Cook-Medley Hostility Scale have been

found to display large increases in blood pressure in response to situations involving interpersonal conflict, harassment, and the disclosure of personal information (Christensen & Smith, 1993; Suarez & Williams, 1989).

Substantial support for the hostility-reactivity connection has been related to poor health outcomes in both laboratory and natural settings. For example, a longitudinal study followed subjects with exaggerated heart rate or blood pressure responses to laboratory challenges for 45 years. These subjects demonstrated increased incidence of myocardial infarction and mortality from CHD when compared to their low-reactivity counterparts (Keys et al., 1971). Research on the precipitants of acute coronary events indicates that arousal of anger may elicit myocardial ischemia in coronary patients and these stress-induced ischemic changes are more pronounced among characteristically hostile patients (Ironson et al., 1992).

It is well documented that aging results in predictable patterns of changes in the cardiovascular system (Anderson & McNeilly, 1991). Specifically, blood pressure tends to increase while cardiac output and heart rate experience minor decrements (Jennings et al., 1997). Structural changes also occur in both the heart and vasculature, essentially an increased stiffness and thickening of both (Folkow & Svanborg, 1993). Aging also negatively impacts cardiovascular reactivity to psychological stress or challenge. Research findings indicate that blood pressure responses to challenge tend to increase with age, whereas heart rate reactions decrease (Jennings et al.).

Physical Activity and Psychophysiological Reactivity

Research investigating the link between level of physical activity and psychophysiological stress reactivity has resulted in mixed findings. It has been indicated that in comparison to attentional diversion, acute exercise is ineffective in lowering reactivity to stress and physical activity was not related to reduction in reactivity to psychosocial stress (Duda, Sedlock, Melby, & Thaman, 1988; Hobson, & Rejeski, 1993). However, other findings show that regular physical activity has been associated with significant decreases in cardiovascular reactivity to stress (Craig, 1999; Hightower King, 2000).

Significant negative correlations have been found between baseline heart rate and fitness level, with fitter subjects having lower baseline heart rates (Hollander & Seraganian, 1984). These same correlations have not been produced in terms of baseline differences in blood pressure according to fitness level, with unfit and moderately fit groups not differing significantly on measures of systolic or diastolic blood pressure (Steptoe, Moses, Matthews, & Edwards, 1990). Although, fitter subjects have been found to have quicker recovery to baseline heart rate. Specifically, studies have shown that physical activity attenuates cardiovascular reactivity, with more pronounced effects present in individuals who display exaggerated emotional responses to stress (Hightower King, 2000). Conversely, it has been demonstrated that in Type A men, physical activity intervention programs were unable to decrease psychophysiological reactivity (Seraganian, Roskies, Hanley, Oseasohn, & Collu, 1987).

Craig (1999) found that fitness was associated with decreases in blood pressure response during stress for men and women who had a family history of hypertension. Fitness has also been linked by research to psychopsychological reactivity in recovery time to a baseline level of heart rate and skin conductance after the presentation of cognitive stressors (Hollander & Seraganian, 1984). Finally, findings from a review of 33 studies indicate that physical activity reduces the impact of psychological stress, although the relationship is thought to be moderate at best and most pronounced for individuals who are highly fit (van Doornen, & de Geus, 1993). In conclusion, it appears that fitness may operate to attenuate some of the effects of reactivity, namely for those who are frequent exercisers, for those who are the most physically fit, for those in recovery from stressful conditions, and for those who display an exaggerated response to stress. Nevertheless, these effects may not be noticeable within Type A Behavior Pattern individuals.

Religiosity and Psychophysiological Reactivity

Many religions propose that adherents conduct themselves according to the general rule of moderation (Ferraro & Albrecht-Jensen, 1991). This rule could possibly be inclusive of emotion. Earlier it was established that those individuals who are the most hostile have similar hostile reactions to stress (Christensen & Smith, 1993; Suarez & Williams, 1989). Additionally, it has been suggested that a religious style characterized by internalization of religious tenants and service to a "higher good" may limit the negative, and potentially pathogenic, influence of hostility (Masters, Ives, &

Shearer, 1997). This religious style intuitively relates to the intrinsically religious individual.

Williams (1989) suggested that hostility might be rooted in both environmental and genetic causes, with environment setting the stage for individuals who later are characterized by cynicism, self- absorption, and a mistrust of others. In contrast, many of the world's religions teach and encourage service to others, hope, trust and kindness, all of which run counter to hostility. Consequently, if individuals intrinsically accepted these tenets they may be less likely to respond with hostility and anger to provocative events.

A final link between religiosity and reactivity lies in the area of personal control. Stressful responding, likened to reactivity to stressful stimuli, has been found to be related to feelings of lack of control over a situation or an inability to cope with that situation (McIntosh & Spilka, 1990). It has been demonstrated that religiosity may function to offer feelings of control and more importantly, may foster an ability to cope less reactively with stressful stimuli.

Religiosity and Physical Activity

There is little or no research investigating how religiosity may influence physical activity, or how the two combined may affect reactivity. As demonstrated throughout the previous pages, both physical activity and religiosity have generally positive effects on physical and mental health. Is there a possibility that in combination the two could have additive effects for health? The mechanisms that link religiosity to

health may have parallels in the links between physical activity and health. For example, the concept that the body is sacred is proposed by many religions, which may itself promote physical activity as a means of caring for and maintaining one's body. The behavioral prescriptions of some religions could undoubtedly encourage physical activity as a means of glorifying God through one's care of the body (McIntosh & Spilka, 1990).

Another interesting potential parallel is the psychological benefits of both religious involvement and physical activity. A parallel may exist between these two in the realm of social support. A study reviewed earlier revealed that for an elderly population, four out of five of their best friends came from church; individuals received interaction and support from their best friends at church (Koenig, Moberg, & Kvale, 1998). Similarly, physical activity may be a mode for social support, which could be paralleled by the feelings of belonging to a religious group. Similarly, a group of runners may rely on each other to keep running, improving each other's emotional and physical well being (Masters, Ogles, & Jolton, 1993).

People may stay in church and with the runner's group for more reasons than are on the surface. Actually, they may continue to carry out these activities because they do not want to disappoint their peers because they know these individuals are depending on them for social support, via affiliation with others and recognition from peers (Masters et al., 1993). Additionally, it has been found that older runners rely more on the social aspects of running with a group than do younger runners (Ogles & Masters, 2000). This presents another interesting parallel between religion and physical activity specifically

for older adults. It is increasingly obvious that social support becomes more important as individuals age. Consequently, individuals who receive social support from either religious involvement or physical activity groups may be similar and likely to appreciate the benefits that either may offer. Also, these individuals may be more likely to preserve the situation in which they receive social support and seek the same sense of belonging from other areas.

Summary

In light of demographic shifts, the mean age of the United States population is increasing. Consequently, research to address issues regarding older adults is becoming more salient. In addition, demographic data also indicate that the rate of physical activity in older adult populations is seriously deficient. This is of paramount concern due to the fact that physical activity is well documented to exert positive benefits on physical and mental health outcomes, particularly for older adults. Physical activity serves important functions in older adults through decreased rates of some of the deadliest negative health outcomes such as CHD, stroke, obesity, cancer, and Type 2 diabetes. Finally, physical activity has been linked to positive mental health outcomes such as lowered incidence and recovery time from depression, improved functional status, higher life satisfaction, increased self-esteem and self-efficacy, decreased levels of anxiety, and slower rates of cognitive decline accompanying aging.

Separately, research has demonstrated positive correlations between physical and mental health outcomes and religious involvement. Although the mechanisms by

which religious involvement may effect health have not firmly been established, religious involvement is thought to operate through influence over personal lifestyle and behaviors that effect health, psychological variables, social support, coping mechanisms, and ritualistic religious behaviors such as quiet reflection and prayer. Religious involvement has been categorized a number of ways. A notable categorization of religious involvement involves grouping individuals with the ROS by intrinsic and extrinsic classifications.

The religiosity-health link is considered especially pertinent to older adult populations as they have been found to be more religiously active and reliant on such activity than their younger counterparts. Religious involvement has been linked to health outcomes such as lower all-cause and specific mortality rates, incidence of CHD, lowered blood pressure, cancer, lower rates of functional disability, lower rates of smoking, and lower rates of moderate-to-large alcohol consumption. Religiosity has also been linked to important psychological variables including depression, anxiety, active coping, and recovery time from depressive disorder in older adult populations.

In assessing the literature that states that both physical activity and religious involvement may operate to positively influence health outcomes, it is interesting to hypothesize how the two might work together to influence a construct like psychophysiological reactivity. Research indicates that stress, which results in reactivity, has negative health implications. Namely, stressful reactions to stimuli, particularly hostile responses have been linked to CHD. It is believed that such hostile responses increase blood pressure, heart rate, release of free fatty acids, and the release

of stress-related hormones, which increases the development of CHD. Increased reactivity, when combined with the effects of aging (e.g., increase in blood pressure, decrease in cardiac output, structural changes to the heart, and increasing reactivity to stress or challenge) may serve to have greater than normal detrimental effects for aging individuals.

Thus, the combining of one empirically supported mechanism for boosting positive health outcomes, physical activity, with a strongly hypothesized mechanism for improving health outcomes, religiosity, may undoubtedly make a positive contribution to the research literature in light of psychophysiological reactivity. These outcomes are of particular importance to the older adult population in terms of the relevance of physical and mental health in aging.

Purpose and Objectives

This study was designed to examine the effects of reactivity to interpersonal and cognitive stressors as related to religious orientation and the potential interaction of physical activity level. In light of the literature, it was hypothesized that the way participants responded to stressors would vary by both religious orientation and level of physical activity. Those who had intrinsic religious orientations were predicted to be less reactive to stress and more physically active. Those who had extrinsic religious orientations were hypothesized to be more reactive to stress and less physically active.

Research Questions Addressed

The specific research questions addressed in this study were as follows:

1. Will older adults characterized by intrinsic religiosity have higher physical activity levels than those characterized by extrinsic religiosity?

2. Will older adults characterized by intrinsic religiosity have less psychophysiological reactivity to stressors than those characterized by extrinsic religiosity?

3. Will those characterized as intrinsically religious and high in physical activity have the lowest reactivity to stressors?

4. Will those participating in the most physical activity have the least reactivity regardless of religious orientation?

CHAPTER III

METHODS

Participants

Seventy-five participants were recruited through targeted advertising directed to older adults. Paid advertisements and community service announcements in print media were utilized. Telephone calls announcing the study were made to senior citizen organizations and churches. Meetings were arranged to visit these groups in person to announce the study and recruit participants. Individuals responding to these announcements were asked to provide demographic information and certain health characteristics. The recruitment procedures were not expected to produce a random sample from the older adult population but rather to select individuals who met specific criteria.

Screening involved choosing subjects that met specific criteria by demonstrating either intrinsic or extrinsic religiosity based on administration of the ROS. The ROS has become the most widely used measure in the empirical study of religion (Masters & Bergin, 1992). As recommended by Donahue (1985), those scoring above 27 on the intrinsic scale and below 33 on the extrinsic scale qualified as intrinsically religious while those scoring below 27 on the intrinsic scale and above 33 on the extrinsic scale qualified as the extrinsically religious sample. In delineating the sample, 49.3% of the participants were intrinsic, 50.7% were extrinsic. All other groupings resulting from the ROS (proreligious and nonreligious) were excluded from the study.

Subjects were also screened for depression, by administration of the Geriatric Depression Scale (GDS; Yesavage et al., 1983). The GDS was developed for use as a screening device for older adults, is considered a simple task, and has been found to differentiate depressed from nondepressed adults (Yesavage, 1986). Scores are further delineated by sex in Table 1. Subjects were also screened for cognitive impairment using the Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975). Participants were required to score a minimum of 24 points to be included in the study; all participants were able to meet the cutoff criteria.

Participants above the age of 60 were recruited; the mean age of the sample was 71.7 ($SD = 6.11$). Due to the high rates of dementia in individuals over 80, participants older than 80 were screened regarding cognitive capacity, which required that they meet the same standards as younger participants on the MMSE and health, which required them to have no history of heart problems (myocardial infarction, angina, etc). Consequently, the sample includes three participants who were above 80. Screening also involved asking individuals if they had a cardiovascular insult such as an ischemic heart attack, myocardial infarction, or cerebrovascular accident (stroke) within the past 5 years. If participants reported having any of these health complications, they were excluded from the study due to potential health risks.

In looking specifically at religious affiliation, there was a relatively diverse population in light of the homogenous nature of the community where the research was conducted. Forty-two percent of the sample had religious affiliation with The Church of Jesus Christ of Latter-day Saints, 22.7% identified with a Protestant/Christian

Table 1

Primary Demographics of Sample

		Group (N = 75)			
		Male (n = 39)		Female (n = 36)	
Demographics	Variables	*n*	%	*n*	%
Continuous					
Age	Mean		72.08		71.91
	SD		6.53		5.68
Geriatric depression scale	Mean		.74		.92
	SD		1.21		1.34
Alcohol consumption/wk	Mean		1.56		1.44
	SD		2.22		2.24
Categorical					
ROS	Intrinsic	19	48.7	18	50.0
	Extrinsic	20	51.3	18	50.0
Religious affiliation	LDS	19	48.7	13	36.1
	Catholic	1	2.6	4	11.1
	Protestant/Christian	9	23.1	8	22.2
	Jewish	6	15.4	6	16.7
	Other	2	5.1	2	5.6
	None reported	2	5.1	3	8.3
Marital Status	Married	30	76.9	25	69.4
	Divorced	4	10.3	1	2.8
	Widowed	1	2.8	7	19.4
	Not reported	4	10.3	3	8.3
Education level	High school	4	10.3	6	11.0
	Some college	6	15.4	11	30.6
	Two-year degree	1	2.6	3	8.3
	Four-year degree	7	17.9	5	13.9
	Graduate study	19	48.7	10	27.8
	Not reported	2	5.1	1	2.8
Social contacts	Inadequate	0		1	2.8
	Adequate	27	71.1	26	72.2
	Optimal	11	28.9	8	22.2
	Not reported	0		1	2.8
Employment status	Retired	33	84.6	30	88.2
	Working	6	15.4	4	11.8
Ethnicity	Caucasian	36	92.3	35	97.2
	Hispanic American	0		1	2.8
	Other	3	7.7	0	
	Not reported	0		0	

religion, and 16.0% reported affiliation with the Jewish faith. Finally, 6.7% of subjects identified as Catholic, and 6.7% of the sample listed that they were not affiliated with a particular religion. Conversely, the ethnicity of the sample was relatively homogenous, with 94.7% classifying themselves as Caucasian, 4.0% reporting "other," and 1.3% classifying themselves as Hispanic American.

There was a relatively equal gender representation, with 48% female and 52% male participants. The majority, 73.3% of subjects were married, 10.7% were widowed, 6.7% were divorced, and 9.3% had never married. The education level of participants was high, with 38.7% participating in graduate study, 16 % having a four-year degree, and 22.7% having "some college" background. The bulk of participants reported that overall, their social contacts were adequate (70.7%), with 25.3% reporting optimal levels of social contacts, and 1.3% reported that their social contacts were inadequate.

The overall sample was divided into intrinsic and extrinsic subgroups. Differences between these two groups were expected. Noteworthy differences existed in the areas of diversity in religious affiliation, amount of alcohol consumption per week, and social contacts. In terms of religious affiliation, the majority (73.0%) of intrinsic participants endorsed affiliation with the LDS church, whereas the extrinsic group was more diverse in affiliation, with the largest constituency belonging to the Jewish faith (31.6%). These differences are detailed further in Table 2.

Table 2

Summary of Demographic Characteristics for Intrinsic and Extrinsic Groups

	Intrinsic						Extrinsic					
	Male		Female		Total		Male		Female		Total	
Demographic characteristics	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Age (years)												
Mean		69.89		70.50		70.19		74.15		71.90		73.08
SD		5.65		6.46		5.98		6.78		4.86		5.98
Social contacts												
Inadequate	0		1	5.6	1	2.7	0		0		0	
Adequate	13	68.4	11	61.1	24	64.9	14	73.7	15	83.3	29	78.4
Optimal	6	31.6	5	27.8	11	29.7	5	26.3	3	16.7	8	21.6
Blank	0		1	5.6	1	2.7	0		0		0	
Religious affiliation												
LDS	15	78.9	12	66.7	27	73.0	4	20.0	1	5.6	5	13.2
Catholic	0		2	11.1	2	5.4	1	5.0	2	11.1	3	7.9
Protestant	4	21.1	4	22.2	8	21.6	5	25.0	4	22.2	9	23.7
Jewish	0		0		0		6	30.0	6	33.3	12	31.6
None	0		0		0		2	10.0	3	16.7	5	13.2
Left blank	0		0		0		2	10.0	2	11.1	4	10.5
Alcohol consumed per week												
Mean		.69		1.11		.90		2.39		1.78		2.10
SD		1.73		2.18		1.95		2.35		2.31		2.32
Education level												
High school			2	11.1	3	8.1	3	15.0	4	22.2	7	18.4
Some college			7	38.9	11	29.7	2	10.0	4	22.2	6	15.8
Two-year degree			1	5.6	2	5.4	0		2	11.1	2	5.3
Four-year degree			2	11.1	4	10.8	5	25.0	3	16.7	8	21.1
Graduate study			6	33.3	16	43.2	9	45.0	4	22.2	13	34.2
Not reported			0		1	2.7	1	5.0	1	5.6		

Procedures

Consent and Initial Measures

Those qualifying after completing all phases of screening were scheduled for an appointment at the laboratory. When making the appointment, participants were asked to abstain from caffeine for 12 hours prior to their appointment and refrain from cigarette smoking for one hour prior to their appointment due to artificial elevation of blood pressure and heart rate that these substances may cause. Upon arrival, all subjects were presented with a consent form that detailed necessary information for them to make an informed decision regarding their participation. The information was reviewed to ensure that subjects had not experienced a cardiovascular insult previously. Participant questions were answered at that time.

Once informed consent procedures were finished the participants completed the GDS and MMSE. In addition, the participants completed the Typical Week Physical Activity Survey (TWPAS; Ainsworth et al., 2002), which was designed to measure physical activity level across a variety of activities for a typical week. They were also asked to identify the most important person in their lives (e.g., spouse, child, etc.). Next, a finger cuff designed to monitor blood pressure was attached to the middle finger on the subject's nondominant hand. Then, as done in previous investigations (Jennings, Kamarck, Stewart, Eddy, & Johnson, 1992; Smith, Nealey, Kircher, & Limon, 1997), they entered a 10-minute baseline period in which they completed a minimally taxing activity. In this case they read a *National Geographic* magazine. During the last three minutes of the baseline phase, blood pressure and heart rate readings were taken at 15-

second intervals. At the conclusion of the baseline period, subjects were asked which article they found the most interesting. Additionally, at this time, the participants completed the State-Trait Anger Expression Inventory-2 (STAXI-2; Spielberger, 1999) and made a rating of their current anger level on the Visual Analogue Scale of Anger (Blumenthal et al., 1995).

Reactivity Manipulation

Following a 10-minute baseline period, the reactivity manipulation was presented. The task was chosen because it represented an interpersonal stressor, and served to test the hypothesis that religiosity is an important mediator of reactivity to interpersonal challenge (Harris, Thoresen, McCullough, & Larsen, 1999). Further, as suggested by Swain and Suls (1996), verbal behavior was controlled, as the task required participants to speak for a specified amount of time (i.e., 180 seconds). A cognitive stressor consisting of verbally expressed mental arithmetic was also presented to participants. The cognitive manipulation did not relate to the study at hand as it was a portion of another study utilizing the same data set.

The reactivity manipulation consisted of a public-speaking task in which the participants were asked to role play an interpersonal confrontation with an insurance adjustor who had just denied payment for a medically necessary intervention (bone marrow transplantation) for the person they had earlier identified as the most important person in their life. They were told that the coverage was denied because of the expense and because no local providers were authorized by the insurance company to perform the transplantation even though there were competent physicians capable of

performing the procedure. This task followed guidelines proposed to accurately recreate psychophysiologically reactive situations (Steptoe, 1986). Participants had 5 minutes to prepare and then verbally delivered their response for 180 seconds in front of the researcher and a small audience. Similar stressors have been previously found to elicit adequate reactivity in other samples (Carney et al., 1998). Following the speech, participants immediately completed the state items of the STAXI-2 and made a rating of their current anger level.

Upon completion of the experiment, an inquiry was made regarding the possibility that the participant was experiencing any adverse effects from the experiment. If subjects felt stressed or angry, they were encouraged to utilize relaxation strategies prior to leaving. Participants were then thanked for their cooperation and paid $30 for their involvement with the study.

Measures

Physical Activity Assessment

The TWPAS was employed to assess physical activity level of participants (Ainsworth et al., 2002). The TWPAS is a recently developed measure designed to assess physical activity involving all life activity within a typical week during the month of participation. Thus, the TWPAS attempts to be all encompassing including physical activity in the realms of occupational activity, self and other care, care of a home/yard, leisure time activity, and intentional exercise activity. Over the period of a week, test-retest interclass coefficient ranged from .43 to .62 for summary scores of

light (less than 3 daily energy expenditures [METS]), moderate (3-6 METs), and vigorous (greater than 6 METs) physical activity. Kappa agreement between TWPAS and physical activity log was acceptable to identify those who met the ACSM moderate and vigorous physical activity recommendations. Scoring of the TWPAS produces total minutes of activity and total MET-minutes of activity for classifications of light, moderate, and vigorous physical activity (Ainsworth et al.). A copy of the TWPAS can be found in Appendix B.

Mini-Mental State Examination.

The MMSE (Folstein et al., 1975) was employed to assess for cognitive impairment. The MMSE is one of the most widely used measures in assessing older adults. This measure consists of standardized questions that tap a range of cognitive abilities, including orientation for place, time, memory, and attention. The MMSE has been utilized in a variety of settings with nonimpaired and impaired older adults. Total score on the MMSE has been considered to be a global measure of cognitive decline in impaired individuals, and is related to cognitive performance in normal older adult samples (Hill & Backman, 1995). With a score range from 0 to 30, a cutoff score of 24 has been found to indicate cognitive decline; consequently, individuals scoring below that level were excluded from participation (Hill & Backman, 1995).

Religious Orientation Scale

The ROS, developed by Allport and Ross (1967), was utilized to delineate religiosity. The ROS is a self-report measure that requires individuals to answer

multiple-choice items in reference to religious and spiritual beliefs. It is considered a reliable indicator of what degree religious values are incorporated into everyday life and functioning (Commerford & Reznikoff, 1996; Koenig, George, & Petersen, 1998; Koenig, Moberg, & Kvale, 1998; Payne et al., 1991). The ROS serves to categorize individuals into four groups: intrinsic, extrinsic, proreligious, and nonreligious. As previously mentioned those categorized as intrinsic generally enjoy more positive health outcomes than extrinsic individuals (McIntosh & Spilka, 1990). Health outcomes have been found to be the worst for those in the proreligious group (Koenig, Moberg, & Kvale, 1998), and those who rate themselves as non-religious have not been studied as extensively in this context due to the fact that a lack of religious commitment is not what the ROS serves to measure. For the purposes of the current study, those individuals qualifying as intrinsic and extrinsic were screened for participation, with Intrinsic status = 1, and Extrinsic status = 0.

Geriatric Depression Scale

Participants were screened for depression utilizing the GDS (Yesavage et al., 1983), prior to being scheduled for participation and can be found in Appendix A. The GDS was developed for use as a screening device for older adults, is considered a simple task, and has been found to differentiate depressed from non-depressed adults (Yesavage, 1986). Specifically, the GDS has been found to correlate with therapist ratings of depressed versus nondepressed individuals in a study where the therapist was blind to GDS scores. Sample scores were relatively low (M = .83, SD = 1.27). Individuals scoring above 5, which is indicative of depressive symptomology, were

excluded from participation (Yesavage et al.).

Physiological Measures

Physiological recording of heart rate (HR), as well as systolic (SBP) and diastolic blood pressure (DBP) were monitored during the baseline and experimental periods using a procedure adapted from Smith et al. (1997). Briefly, a 2300 Finapres portable Blood Pressure Monitor (Ohmeda, Englewood, CA) was employed to assess both HR and blood pressure. The Finapres finger cuff was attached to the middle phalanx of the middle finger of the nondominant hand. Previous studies have documented the reliability and validity of HR, as well as SBP and DBP assessments using the Finapres (Gerin, Pieper, Marchese, & Pickering, 1993; Parati, Casadei, Groppelli, Rienzo, & Mancia, 1989). Measures of reactivity (HR, SBP, and DBP) were obtained every 15 seconds throughout administration of the interpersonal stressor.

Baseline physiological functioning was determined by extracting three 60-second segments of HR DBP, and SBP from the last 3 minutes of the baseline before introduction of the stressor. The data from the baseline period was averaged to produce a single mean level for each measure. Experimental reactivity was assessed in the same manner. However, in this case, three 60-second segments of HR and blood pressure were averaged to produce a single mean level of stressor HR and blood pressure.

Self-Report Measures of Anger

Two measures of subjectively experienced anger were used: the State Anger Scale of the STAXI-2 and the Visual Analogue Scale of Anger. The STAXI-2 is a new

and expanded version of the previous and often-used scale developed by Spielberger, Jacobs, Russell, and Crane (1983; Spielberger et al., 1985). The State Anger Scale was designed to assess the intensity of anger as an emotional state at a particular point in time. In addition, the STAXI-2 has been found to be highly correlated with the Buss-Durkee Hostility Inventory (BDHI), the Hostility (Ho) and Overt Hostility (Hv) scales of the Minnesota Multiphasic Personality Inventory, which demonstrates strong concurrent validity of the STAXI as a measure of hostility and anger (Spielberger, 1999). It consists of 15 items answered on a 4-point scale. The scale was normed on over 1,900 individuals and has norms for older adults. Internal consistency has been found to be high, alpha coefficient measures of internal consistency were .94 and .92 for normal males and females respectively (Spielberger). The STAXI-2 State Anger Scale was administered twice during the experiment (i.e., following the baseline and following the reactivity manipulation). It should be noted that the sample approximated low mean scores (not clinically significant) provided in normative information on the STAXI-2 for a combined male and female sample of normal adults age 16 and above. The sample mean of 14.80 (*SD* = 2.97) on trait anger resembled the 20th percentile of the normative sample. The state anger mean reported in terms of the study sample (15.87, *SD* = 2.59), placed the sample at the 40th percentile when compared to STAXI-2 norms (Spielberger).

The Visual Analogue Scale of Anger (Blumenthal et al., 1995) was used to measure the participant's current level of anger during the baseline, as well as during the experimental reactivity condition. This scale involved marking a point on a line of

100 millimeters in length with anchors of "not angry" to "angry as I have ever been" on both ends of the line. This scale had been used in previous reactivity studies and had been found to accurately assess the psychological state of anger that was sensitive to physiological reactivity (Blumenthal et al.). Baseline anger was determined by taking two ratings of the Visual Analogue scale at the beginning and end of the baseline period before introduction of the stressor. The data from these two time-point ratings was averaged to produce a single mean level of baseline anger. Experimental anger was assessed immediately following the stressor, and after a 3-minute delay. The delay anger rating helped to gauge the degree to which the stressor produced a sustained anger response in the participant. As described for baseline anger, the average of these two anger ratings were computed.

CHAPTER IV

RESULTS

Due to the length of data collection and the location within a cold weather climate, preliminary analyses were conducted to determine if there were significant differences between cold- and warm-weather months in terms of physical activity. Analyses consisted of determination of average daily temperature for each month. Months with average daily temperatures above 65 degrees Fahrenheit were considered "warm" months, with those with average daily temperatures below 65 degrees Fahrenheit considered "cold" months. Five months were considered "warm" months, (May through September) and seven months were considered "cold" months (October through April). No significant difference was apparent between level of physical activity during warm and cold months.

Descriptive analyses were conducted individually for the intrinsic and extrinsic samples for each dependent measure. These analyses were also conducted for the entire sample as a whole for each dependent measure. The results of these descriptive analyses are presented in Table 3. The change scores refer directly to differences between the pretest and posttest evaluation of the participant's level of reactivity, either by self-reported anger or by physiologic evaluation. These results were utilized to facilitate further analysis required to answer research questions.

Differences in Physical Activity Level

Initially, to determine whether older adults characterized by intrinsic religiosity

Table 3

Descriptive Statistics for Reactivity Change Scores and the TWPAS

	Intrinsic (n = 37)		Extrinsic (n = 38)		Full sample (N = 75)	
Dependent variables	*m*	*SD*	*m*	*SD*	*m*	*SD*
State anger change	3.19	5.21	8.16	12.30	5.71	9.75
Current anger change	10.73	16.24	19.05	27.05	14.95	22.63
HR change	11.19	17.64	7.72	8.30	9.43	13.75
SBD change	21.84	30.15	39.53	25.37	30.81	29.04
DBP change	14.67	14.83	21.20	15.08	17.98	15.21
TWPAS total	1692.86	1010.52	1621.54	881.30	1552.10	741.48

Note. Blood pressure is abbreviated above as "BP." TWPAS total refers to the total MET minutes each individual engaged in during a typical week as calculated with the TWPAS.

had higher physical activity levels than their extrinsic counterparts, an independent samples *t* test was calculated with two levels of the independent variable, intrinsic religiosity and extrinsic religiosity, and the TWPAS score as the dependent variable. A *t* test was conducted to evaluate the hypothesis that intrinsically oriented individuals are more physically active than extrinsically oriented individuals. The analysis did not produce statistically significant results, t (73) = .689, p = .493, which was counter to the research hypothesis. Intrinsic individuals (M = 1692.86, SD = 1010.52) had slightly higher levels metabolic energy expenditure than extrinsic individuals (M = 1552.10, SD = 741.48). Yet these differences were not great enough to reach statistical significance, and the standard mean difference effect size suggested that (ES = .16) the magnitude of group differences was relatively small. Although, it should be noted that the sample was overwhelmingly physically active, with 98.7% of the sample meeting the American College of Sports Medicine's guidelines for moderate physical activity.

In turn, it has been noted that approximately 50% of adults over the age of 65 are completely sedentary (DiPeitrio, 2001).

Reactivity to an Interpersonal Stressor

In order to determine whether intrinsic individuals demonstrated less psychophysiological reactivity to an interpersonal stressor, another independent samples *t* test was calculated, with the reactivity measures (i.e., change scores) as dependent measures. The research hypothesis was partially supported by significant findings. Results indicated that intrinsic individuals had smaller state anger change scores than extrinsic individuals $t\ (73) = 2.27$, $p = .026$. This finding indicates that intrinsic individuals ($M = 3.19$, $SD = 5.21$) demonstrated less reactivity or a less angry response when presented with an interpersonal stressor than extrinsic participants ($M = 8.16$, $SD = 12.30$). In reference to the standard mean difference effect size ($ES = .57$), the magnitude of the differences between intrinsic and extrinsic individuals is moderate.

Significant findings $t\ (73) = 2.75$, $p = .007$, were also indicated with SBP change. Intrinsic individuals ($M = 21.84$, $SD = 30.14$) experienced less SBP change in response to the stressor condition than extrinsic individuals ($M = 39.54$, $SD = 25.37$). In regards to the standard mean difference effect size ($ES = .64$), it was suggested that in addition to a statistically significant result, the magnitude of the difference was relatively large. To further address the research hypothesis, significant findings were indicated in both a self-report assessment of an angry, reactive response (state anger change) and a physiological measure of reactivity (SBP). These findings indicated that

extrinsic individuals were more likely to acknowledge and actually experience more reactive responses to interpersonally stressful situations.

Effects of Physical Activity and Religiosity on Psychophysiological Reactivity

Research hypothesis number three asks whether individuals who are intrinsically religious and physically active are the least reactive. This hypothesis allowed for exploration of the combined effects of physical activity and religiosity as protective of health. To statistically test this hypothesis, simultaneous entry multiple regression analyses were conducted with the ROS (intrinsic and extrinsic orientation), the TWPAS, and both the ROS and TWPAS combined as an interaction variable, as predictor variables. The criterion variables were the reactivity change scores. It should be noted that ROS was entered as a categorical variable, with Intrinsic status coded as 1 and extrinsic status coded as 0. Table 4 delineates results of each regression analysis individually, and Table C-1 in Appendix C summarizes results in terms of the linear regression analysis for all variables utilized to predict reactivity change.

Systolic Blood Pressure Change

The linear combination of ROS, Total MET minutes, and the interaction of the two variables was significantly related to SBP change F (3, 74) = 3.33, p = .024. The sample multiple correlation coefficient was .35, indicating that approximately 12% of the variance of the SBP change can be accounted for by the combination of the ROS, total MET minutes, and the interaction of the two. In addition, individually, the

Table 4

Multiple Regressions Predicting Reactivity Change Scores

Predictor		β	R^2 adj	F model
State Anger Change				
Model 1	ROS	-.458	.057	2.48*
	TWPAS	-.280		
	ROS * TWPAS	.291		
Current anger change				
Model 1	ROS	-.328	.012	1.29
	TWPAS	-.213		
	ROS * TWPAS	.207		
HR change				
Model 1	ROS	.236	.007	1.17
	TWPAS	-.104		
	ROS * TWPAS	-.131		
SBP change				
Model 1	ROS	-.473	.086	3.33**
	TWPAS	-.270		
	ROS * TWPAS	.244		
DBP change				
Model 1	ROS	-.183	.054	2.41
	TWPAS	-.203		
	ROS * TWPAS	-.022		

Note. TWPAS refers to the summary score produced by this measure, which is Total MET Minutes.

* $p = .068$

** $p = .024$

prediction variables demonstrated linkage to SBP change. In terms of the individual relationships between the predictor variables and SBP change, ROS correlated moderately with the change score, $r = -.307$, $p = .004$, and the interaction variable (ROS * Total MET minutes), $r = -.274$, $p = .009$, indicating that extrinsic status was correlated with higher SBP change scores. Additionally, the interaction of ROS and Total MET minutes indicated that intrinsic status and level of physical activity were significantly correlated with SBP, although to a lesser degree than ROS alone. The last correlation did not reach statistical significance, yet the relationship between Total MET minutes

and SBP produced a nearly significant correlation, $r = -.168$, $p = .075$.

State Anger Change

The linear combination of ROS, total MET minutes, and the interaction of the two variables did not meet statistical significance related to state anger change. Although the model was near to statistical significance, $F = 2.48$, $p = .068$. In terms of individual analyses, the combination of the interaction variable with total MET minutes and ROS was significantly correlated to state anger change, $r = -.222$, $p = .028$, indicating that intrinsic individuals had a smaller degree of change than extrinsic participants. Although the regression model for state anger change did not demonstrate statistical significance, and total MET minutes alone was not significantly correlated with this change score, the change score was significantly correlated with ROS. This correlation between state anger change and ROS, $r = -.256$, $p = .013$, demonstrated that ROS might be a strong independent predictor for state anger change, with extrinsic individuals experiencing a larger change as a result of an interpersonal stressor.

Diastolic Blood Pressure Change

In attempting to predict DBP change, the linear combination of ROS, total MET minutes, and the combination of the two, the regression did not produce a statistically significant result. However, the result approached significance, and thus was worth noting. The regression utilizing the above-mentioned three predictor variables produced an $F = 2.408$, $p = .074$, further a correlation between the variables was $r = .304$. Consequently, the prediction variables accounted for approximately 9% of the

variance in DBP change. Statistically significant relationships were found between DBP change and all the prediction variables independently. Diastolic blood pressure was found to correlate negatively with the prediction variables. The relationships ranged from $r = -.279$ to $r = -.216$ with $p = .008$ to $p = .031$, more specific information regarding the individual correlations is found in Table 5. Of particular interest, DBP change was found to significantly correlate with the interaction variable TWPAS*ROS, $r = -.279$, $p = .015$. This result indicates that since extrinsics were coded as 0, and the interaction variable was created by multiplying the ROS score of 0 or 1 by the Total MET minutes TWPAS score, it is evident that extrinsic participants had larger diastolic blood pressure change scores than their intrinsic counterparts.

Current Anger Change

In reference to the linear regression combining ROS, total MET minutes, and the interaction of the two, the overall regression attempting to predict current anger change was not statistically significant. Although total MET minutes alone was not significantly correlated with current anger change, the interaction variable combining total MET minutes and ROS approached a significant correlation, with current anger change, $r = -.167$, $p = .076$. Correlational analysis also revealed another relationship, which was nearly significant, between current anger change and ROS, $r = -.185$, $p = .056$. Consequently, this reactivity measure may be marginally predicted by a variety of variables including the interaction between physical activity and religious orientation along with religious orientation alone.

Table 5

The Bivariate Correlations: Prediction Variables with Reactivity Change Scores

	Reactivity change scores				
Predictors	State anger change	Current anger change	HR change	SBP change	DBP change
ROS	-.256*	-.185* (p = .056)	.127	-.307**	-.216*
TWPAS	-.150	-.121	-.159	-.168	-.230*
ROS * TWPAS	-.222*	-.167	-.008	-.274**	-.279**

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

Heart Rate Change

The linear combination of ROS, total MET minutes, and the interaction of the two aforementioned variables was not found to significantly predict HR change in participants. In addition, none of the variables alone were found to be significantly correlated to HR change. Although, total MET minutes was negatively correlated (r = -.159, p = .086) to heart rate change, it was not at a level that reached statistical significance. Consequently, it appears that this group of predictor variables was not found to be particularly strong in predicting HR change for this sample.

Bivariate Relations

In Table 5, indices to signify the relative strength of the individual predictors are presented. Nearly all of the bivariate correlations between the reactivity change scores and the predictor variables are negative, as expected. Seven of the 15 indices were

statistically significant (p <.05). On the basis of these correlational analyses, it is evident that ROS, total MET minutes, and the interaction of religiosity and physical activity (ROS * TWPAS) were useful predictors for the degree of blood pressure change. The ROS alone accounted for 9.4% of the variance of the SBP change, while the interaction variable (ROS * TWPAS) accounted for less variance, 7.3%.

Table 5 also shows that ROS had larger predictive value when including all correlations regardless of statistical significance. Consequently, it appeared that physical activity alone did not emerge as a particularly strong predictor of how an individual will react to interpersonally stressful stimuli. Nevertheless, physical activity was found to correlate with DBP change at a statistically significant level (r = -.230, p = .047). In conclusion, it was evident that as a result of slightly mixed findings, physical activity and potential effects on reactivity was an area ripe for continued exploration.

CHAPTER V

DISCUSSION

Overview

The purpose of this study was to explore the potential relationship between physical activity, religiosity, and how these two variables might work together to influence psychophysiological reactivity to an interpersonal stressor. The research questions addressed included: (a) are older adults characterized by intrinsic religiosity more physically active than those characterized by extrinsic religiosity; (b) do older adults characterized by intrinsic religiosity have less psychophysiological reactivity to an interpersonal stressor than older extrinsics; (c) will older intrinsic individuals have the lowest reactivity along with the highest levels of physical activity; and (d) will those individuals who are the most physically active have the least reactivity regardless of their religious orientation? The discussion that follows will include a summary and interpretation of the findings directly related to each of the above questions. Conclusions based on these findings will also be discussed. The discussion will end with general conclusions, an overview of limitations of the study, and suggestions for the direction of future research.

Differences in Physical Activity Level Between Intrinsic and Extrinsic Participants

Based on a lack of research involving physical activity and religiosity, it was

hypothesized that since religiosity had been linked to positive health outcomes in the past, it might be related to physical activity as a means of positively influencing physical and mental health. According to previous research, intrinsic religiosity had been linked to better mental and physical health for adherents when compared to individuals classified as extrinsically religious. Therefore, it was hypothesized that intrinsics would demonstrate higher levels of physical activity than extrinsics.

Results indicated that this research hypothesis was not supported. According to an independent samples *t* test, those who were intrinsically religious were not significantly more physically active than extrinsic individuals, although the intrinsic sample had a higher mean level of physical activity as evidenced by total MET minutes. In addition, the standard mean difference effect size (*ES* = .16) supported that any between-group differences was small.

However, it is notable that this sample was overwhelmingly physically active in reference to the general population. Due to the fact that 98.7% of the sample was at least moderately physically active, there may have been a restriction of the possible range of scores. Such restriction may have served to negatively affect the possibility of finding a significant difference. Consequently, more research utilizing samples with a broader range of physical activity levels was required before drawing any definitive conclusions regarding potential links between physical activity and religiosity.

It was hypothesized that physical activity could be linked to religiosity in light of other health outcomes research in the area. This related research indicated that intrinsically religious adherents were less likely to engage in unhealthful behaviors such

as smoking cigarettes, consuming alcohol, and engaging in risky sexual behaviors (Ferrarro & Albrecht-Jensen, 1991), in addition to being taught to approach life in a more moderate emotional manner than extrinsic individuals (Levin & van der Pool, 1991). In addition, many religious creeds direct adherents to view their body as a temple to be well cared for, potentially leading them to engage in physical activity (Dull & Skokan, 1995). Although, the hypothesis was not supported in the current study, continued investigation is needed.

Psychophysiological Reactivity to An Interpersonal Stressor Based on Religious Orientation

Based largely upon previous research it was hypothesized that intrinsic individuals would be less reactive to an interpersonal stressor. Research findings indicated that intrinsic individuals may be less likely to react to interpersonal stressors due to religiosity exerting feelings of control (Dull & Skokan, 1995; Idler, 1987), aiding in coping (Ellison, 1998; Helm et al., 2000), and belief that a higher power will help one in dealing with stressful events (McIntosh & Spilka, 1990). The results partially supported the hypothesis with statistically significant differences regarding state anger change and SBP change. Statistically significant differences were not demonstrated for the remainder of the reactivity change scores.

Differences between groups in regards to state anger change, according to mean difference effect size (*ES* = .57), would account for a moderate difference in terms of magnitude. In addition, the standard mean difference effect size (*ES* = .64) between

groups in reference to SBP is also indicative of a moderate between-group difference. It should be noted that the baseline readings of the sample were consistent with normative information on the STAXI-2, which placed the sample average at the 20th percentile in terms of trait anger and at the 40th percentile in terms of state anger when compared to a normal combined male and female adult sample (Spielberger, 1999). It is notable that the two statistically significant differences between groups are in two different areas of reactivity assessment. SBP is an objective measure of psychophysiological reactivity. Conversely, state anger change is a self-report measure of reactivity. Consequently, not only were extrinsics more psychophysiologically reactive to stress, as measured by systolic blood pressure, but were also more aware of their reactive response, reporting an angry response in reference to the stressor.

Overall, these findings suggested support of past research literature, which indicated that intrinsics were less likely to be reactive to interpersonal stressors due to general rules of moderation in conduct (Ferraro & Albrecht-Jensen, 1991), influences of a "higher good" that have been indicated to limit the effects of hostility (Masters et al., 1997). In addition, intrinsic individuals may enjoy the results of a specific set of spiritual or psychosocial resources that bolster their response to stress (Ellison et al., 2001). The limiting effects of hostility found in previous research were of particular interest in reference to the present study. Findings indicated that large state anger change scores indicated an angry and consequently, hostile response. The present study supported previous research in this area, demonstrating that extrinsic individuals had higher state anger change scores, which equated to a more hostile response as well as

having more pronounced physiological change in systolic blood pressure reactivity.

Another body of related research also supported the less hostile response of intrinsic individuals. Findings relating intrinsic status to positive health outcomes were quite extensive. Intrinsic individuals were thought to enjoy greater feelings of personal control than extrinsic individuals (Ellison et al., 2001; McIntosh & Spilka, 1990). Feelings of personal control may serve to buffer the effects of stressors and intern, psychophysiological reactivity. Findings of the current study upheld this hypothesis in that intrinsic individuals experienced less physiological reactivity (SBP) as well as reported less reactive responses to the interpersonal stressor. Additionally, it should be noted that previous research supported these findings in terms of a greater degree of SBP reactivity than DBP reactivity to interpersonal challenge.

Intrinsic individuals may also benefit from such maxims as forgiveness (Ellison et al., 2001). Forgiveness could serve to lessen the psychological burden of a lowered threshold to stress that was more likely to be found in extrinsic individuals who tend to utilize religious involvement for personal recognition, and had a more superficial religious commitment than intrinsic individuals (Koenig, Moberg, & Kvale, 1996). Consequently, a possible explanation for the between-group differences noted within the current study related to intrinsics having a higher tolerance for stress due to an ability to forgive others for wrongdoing. Extrinsics may have been more likely to hold a grudge regarding the interpersonal stressor presented in the study, resulting in a more hostile, angry response to the stressor.

Intrinsic individuals were also more likely to rely on their religious involvement

in light of stressors (Koenig, 1993). Because extrinsic individuals were less likely to rely on social support mechanisms provided by religious belonging, they were more likely to experience interpersonal stressors as threatening due to the fact that they had only themselves to rely on in dealing with the stressor. Intrinsic individuals were less personally reactive because of knowledge that they depended on support from others and their religious institutional affiliation. Consequently, this could have been a factor in the current study in that extrinsics may have felt the interpersonal stressor as more frightening, and thus responded in a hostile manner.

Physical Activity and Religiosity Regarding Psychophysiological Reactivity

Based on the lack of research combining physical activity, a known mediator of physical and mental health with religiosity, a strongly hypothesized link to positive health outcomes, it was hypothesized that these two constructs might offer a heightened level of positive health outcomes when combined. Consequently, it was thought that higher physical activity levels and intrinsic religiosity classification would interact to produce the least reactive individuals. This hypothesis proposed that physically active intrinsic individuals would reap the benefits of having the lowest reactivity when compared to all other groups within the study, and was based on separate research that demonstrated positive health outcomes in relation to both quantity of physical activity and intrinsic religiosity.

Previous research in the area of physical activity was clearly linked to

improvements in a variety of physical and mental health realms (Blair & Jackson, 1998). Research went further to propose that there were specific health benefits for older individuals (DiPietro, 2001). Although past research in terms of physical activity and reactivity had resulted in mixed findings, the overwhelmingly documented positive health outcomes led to the hypothesis that physical activity might be linked to lower levels of reactivity. Separately, as previously discussed, there was reason to believe that intrinsic individuals would have lower levels of reactivity as a result of the integration of certain religious beliefs. Finally, the hypothesis that intrinsics who were physically active would be the least reactive was partially supported through use of a simultaneous entry multiple regression.

Significant findings resulted from the multiple regression equation, which utilized ROS and Total MET minutes (a TWPAS derivative) alone along with the interaction of ROS and Total MET minutes in an effort to predict reactivity change scores. A single change score that was statistically significantly predicted by the regression model was SBP, with a second, state anger change nearing statistical significance. Systolic blood pressure was successfully linked to the multiple regression model, indicating that the combination of ROS, total MET minutes, and the combination of these two predicted approximately 12% of the variance in this physiological measure of reactivity. This finding contributed to previous literature demonstrating a higher level of SBP change during speech preparation, delivery, and recovery in hostile individuals (Gallo, Smith, & Kircher, 2000).

This finding also provided support for the hypothesis of a combined effect when

utilizing both ROS and a physical activity assessment in predicting level of psychophysiological reactivity. When looking at the individual correlations between the reactivity measure, ROS, total MET minutes, and the interaction variable, it was evident that the total MET minutes added minimal predictive ability for SBP. First, SBP was significantly correlated with ROS, $r = -.307$, $p = .04$, which would account for approximately 9% of the variance in that change score. Second, the interaction variable correlated significantly with SBP as well, $r = -.274$, $p = .009$. Third, the correlation between SBP and total MET minutes failed to reach statistical significance, although it was near to significant levels, $r = -.168$, $p = .075$.

However, the correlations between the predictors and SBP were all moderate to small. It can be concluded that the predictive value of ROS was almost as great as the prediction of the entire model for SBP change. Consequently, when SBP was predicted by ROS alone, such prediction benefited by a small margin when total MET minutes was added as a predictor. These findings indicated minimal support for the hypothesis that additive predictive effects when combined religious orientation and physical activity levels. However, these findings indicated a very small additive value of physical activity to the already moderate prediction of religious orientation.

Finally, it can be concluded that religious orientation may offer protective effects in buffering reactivity through means other than physical activity promotion. It was hypothesized that religious orientation would be more strongly linked to prescriptions for physical activity. Nevertheless, it can be concluded that religious orientation may operate to influence the variables that have been extensively researched

in the past such as those forbidden or frowned upon by many religious sects, including smoking, drinking alcoholic beverages, and engaging in behaviors deleterious to health (i.e., unprotected sex, hostile reactions to stress; Ellison, 1998). It can also be noted that religious orientation may not operate to influence those behaviors that are encouraged for positive health outcomes such as physical activity and healthy dietary choices. Consequently, it can be remarked in light of the current study, that religious involvement may exert control over prohibited behaviors and affective responses rather than operating to prompt adherents to engage in proactively positive health behaviors, such as physical activity.

None of the other regression models significantly predicted reactivity change scores; yet, there were several notable findings within the individual correlations between ROS, total MET minutes, and the interaction variable combining ROS and total MET minutes. First, a nearly significant relationship was found between the regression model including prediction variables and DBP, $F = 2.408$, $p = .074$. In addition, all of the predictor variables were independently correlated with DBP change at a statistically significant level. DBP was correlated most strongly with the interaction variable, ROS * TWPAS, $r = -.279$, $p = .008$. Research has consistently demonstrated more exaggerated SBP reactivity as a response to challenge than reactions demonstrated by DBP change (Cohen et al., 2000), which could explain why there was a relationship between DBP and the individual predictors, but no significant findings in terms of the regression model. Further, the prediction of DBP via the regression was clearly not as strong as the prediction of SBP.

Although physically active individuals may not enjoy immediate benefits of physical activity in attenuating a psychosocial stressor, benefits existed in terms of recovery from stress (Steptoe et al., 1990). Physical activity data exists, stating that those who are more physically active may have a lower reactivity or a quicker recovery from a reactive state in light of blood pressure (Duda et al., 1988). In terms of significant correlations between ROS and DBP, previous arguments supporting the relationship between SBP change and heightened reactivity to interpersonal stress (Steptoe et al., 1990). Conversely, DBP was typically more responsive to a task such as cold pressor where a subject is required to place their hand in icy water for a specified amount of time (Faulstich, Williamson, McKenzie, Duchmann, & Hutchinson, 1986).

Conclusions

Based on the findings of the current study, it can be concluded that there are differences between intrinsic and extrinsic individuals with regard to reactivity to interpersonal stress. Although small, support was demonstrated for a potential link between physical activity and religious orientation in prediction of psychophysiological reactivity. Consequently, due to the paucity of research in this area, replication is encouraged to further determine the nature and extent of the relationship between religiosity, physical activity, and psychophysiological reactivity.

Limitations and Directions for Future Research

The limitations of the current study provide valuable information and direction

for future research in the area of religiosity, reactivity, and physical activity. One of the central limitations of this study was the measurement of intrinsic and extrinsic in a largely conservative religious population. In past research, intrinsic status has become intertwined with orthodoxy (McIntosh & Spilka, 1990). This is of primary concern due to the fact that 73.0% of the intrinsic sample endorsed membership with the LDS church. It may be, however, that some of the individuals scoring as intrinsic are, in fact, not actually intrinsic. The LDS creed may cause people to formulate answers in light of how they know they "should" respond (McIntosh & Spilka, 1990), which could serve as an example of how a religious creed can be confused with intrinsic status. Consequently, it is unsure what percentage of the sample was purely intrinsic, rather than endorsing intrinsic concepts because they were acknowledged as "right."

Thus, the potential differences between the intrinsic and extrinsic groups could be truncated by a tendency to over identify with intrinsic principles when in reality the participants may not be adherent to those principles. Finally, because there was a significant difference between intrinsic and extrinsic groups in relation to SBP reactivity, one could estimate that the findings may have been more pronounced in a truly differentiated intrinsic/extrinsic sample. Future research including a measure more specific to differentiating pure intrinsic and extrinsic groups may help to determine more accurate differences between groups. In addition, diversity of religious affiliation is suggested in future sample selection.

The high proportion of the sample that was physically active at a much higher level than the general population may also limit the generalizability of study findings.

When referring to the general population in the United States, over 60% of adult Americans are not regularly physically active, and 25% are completely sedentary (U.S. DHHS, 1996). In addition, 38% of men and 55% of women over 75 are completely sedentary (Christmas & Andersen, 2000). Corroborating evidence is found in statistics published by the *Healthy People 2010* initiative, indicating that in 1999, 51% of adults 65 and older were completely sedentary (DiPietro, 2001). The present sample defies this trend. All but one participant met American College of Sports Medicine's (ACSM) guidelines for moderate physical activity. Table 6 presents the physical activity levels of the current sample in reference to ACSM criteria.

With 98.7% of total sample meeting ACSM criteria for moderate physical activity, this sample was overwhelmingly more physically active than the general population. Even more astounding was the finding that 49.3% of the sample met ACSM criteria for vigorous physical activity, which generally has much lower levels in

Table 6

Sample Physical Activity Characteristics

	Intrinsic (n = 37)				Extrinsic (n = 38)			
	Met criteria		Failed to meet criteria		Met criteria		Failed to meet criteria	
ACSM guidelines	n	%	n	%	n	%	n	%
Moderate PA	37	100.0	0		37	97.4	1	2.6
Vigorous PA	18	48.6	19	51.4	19	50.0	19	50.0

Note. The ACSM) has prescribed levels of physical activity consistent with health benefits. Within those prescriptions are suggestions for minimum minutes of moderate and vigorous levels of physical activity (PA). The "Met criteria" heading indicates those individuals who fulfilled the requirements posited by ACSM for moderate and/or vigorous activity.

an older adult population (Pollock et al., 1998). Consequently, this sample reported atypical levels of physical activity when compared to other older adult populations.

This could be due to a variety of factors. First, the sample as a whole was highly educated and most participants were retired. These factors could contribute to a knowledge and appreciation of the benefits of physical activity and the time to carry out such activity. Second, an estimate of the physical fitness levels of the participants was made via calculations, which produced MET minutes of activity per day. This estimate could be skewed due to the self-report nature of the physical activity data collected. Artificial inflation of the amount of physical activity levels may have been a factor in the limitations of the study.

Yet, it could be hypothesized that larger differences between intrinsic and extrinsic individuals may have been found in a sample that resembled the older American adult population more closely. Another potential explanation for a lack of differential physical activity findings between intrinsic and extrinsic individuals may be due to the fact that religiosity operates more influentially over limiting behaviors that are off-limits to religious adherents rather than encouraging engagement in healthy activities. For example, intrinsic and extrinsic individuals within this sample had statistically significantly different rates of alcohol consumption, with intrinsics being more likely to abstain or imbibe at a lower level than extrinsic individuals. Consequently, it could be supposed from the results that religiosity serves to aid individuals in knowing what behaviors that they should avoid (i.e., alcohol consumption) rather than exerting influence on individuals to engage in proactive

healthy behaviors (i.e., physical activity). Thus, this sample demonstrated that religiosity might operate to influence individuals in health choices involving behaviors they should avoid (illicit sexual encounters, excessive alcohol drinking, cigarette smoking). Conversely, religiosity added no significant prediction of which individuals would be most physically active.

Directions for future research taken from limitations involving physical activity must consider the factors of self-report measures and restriction of range. First, self-report measures may not be a reliable indication of actual physical activity because individuals are not often required to quantify the amount and duration of daily physical activity. It would be beneficial for future research to validate self-report ratings with an objective physiological measure. This would allow researchers to determine the accuracy of self-report and potentially develop a method in which to combine the convenience of self-report with the objectivity of physiologic measurement.

Second, it would be wise for future research to attempt to obtain a representative sample in an effort to work with a normal distribution of physical activity. In addition, such efforts could result in findings that are more easily generalized to the general population of older adults than results from the present sample. Further, it would be interesting for future research to examine potential intrinsic/extrinsic differences in light of other healthful behaviors individuals could engage in such as consuming a well-balanced diet. These further analyses may serve to determine more clearly if religiosity operates on healthful behaviors that should be encouraged, rather than only directing adherents away from particular behaviors.

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APPENDICES

Appendix A:

Initial Measures

Information Sheet

Please complete the following:

Age _____ Ethnicity_____

Gender _____ Religious Affiliation (if any) _____

Marital Status (circle one) Married Divorced Widowed Never Married

Highest Education Level (Circle One) Yearly Income_____

1. Some high school
2. High school graduate
3. Some college
4. Two-year degree
5. Four-year degree
6. Graduate study

Current Health Status _____

_____

Previous Health Status _____

_____

Have you been diagnosed or treated for a heart condition or stroke? _____

Please list all current medications. _____

_____

How would you describe your number of social contacts? (Circle one)

Inadequate Adequate Optimal

Do you currently work outside of your home? _____ If yes, what is your job title? _____

Are you retired? _____ If yes, what was your previous job title? _____

_____

Do you smoke tobacco? _____ If yes, how many packs per day? _____

How many years have you smoked? _____

Do you drink alcohol? _____ If yes, how often do you drink in a given week? __

_____

Describe your daily physical activities (e.g., walking, jogging, golf, etc.; How long do you do each one? How many times per week?) _____

_____

_____

Information Sheet

Please complete the following:

Age _____ Gender _____

Current Health Status _____

_____

Previous Health Status _____

_____

Have you been diagnosed or treated for a heart condition or stroke? _____

Please list all current medications. _____

_____

Mood Scale

Instructions: Choose the best answer for how you have felt over the past week.

1. Are you basically satisfied with your life? ..... yes no
2. Have you dropped many of your activities and interests? ..... yes no
3. Do you feel that your life is empty? ..... yes no
4. Do you often get bored? ..... yes no
5. Are you in good spirits most of the time? ..... yes no
6. Are you afraid that something bad is going to happen to you? ..... yes no
7. Do you feel happy most of the time? ..... yes no
8. Do you often feel helplessness? ..... yes no
9. Do you prefer to stay at home rather than going out and doing new things? ..... yes no
10. Do you feel that you have more problems with memory than most? .. yes no
11. Do you think it is wonderful to be alive now? ..... yes no
12. Do you feel pretty worthless the way you are now? ..... yes no
13. Do you feel full of energy? ..... yes no
14. Do you feel that your situation is hopeless? ..... yes no
15. Do you think that most people are better off than you are? ..... yes no

Research Protocol Once at Laboratory
Older Population

1. Ask subject if he/she has had heart attack, stroke, or other diagnosed heart disease in the last 5 years ***If so, participant cannot participate in study.***

2. Have participant sign 2 copies of the informed consent form and answer any questions. You cannot tell them any specific hypotheses about the study. Refer them to me if they want more information regarding the purposes of the study. Provide participant with one copy of consent form and keep one for our records.

3. Write participant number on every form!

4. Have subject complete Health Questionnaire and TWAPS. Be sure both sides of the Health Questionnaire are completed. Give instructions for the TWAPS and check that it is fully completed.

5. Have participant complete lab demographic sheet. Review short demographic sheet submitted with ROS and ask follow up questions if necessary.

6. Attach finger cuff to middle finger of non-dominant hand. Make sure that electrodes are on meaty side of finger and that wires exit the cuff in the direction of the body. Watch the machine to be sure that calibration has occurred. (Solid line rather than dotted.) Once it has, note baseline and set machine to continuous monitoring.

7. Ask participant to identify the most important person in his/her life. (Write this down, bottom of lab demographic sheet)

8. Have participant sit quietly looking at magazines for 10 minutes (be sure to time precisely). Explain that at the conclusion of the lab session, you will ask him/her for the most interesting article he/she read. During the last 3 minutes (180 seconds) record blood pressure and heart rate every 15 seconds. Note: participants should not talk during this phase.

9. At the conclusion of the 10 minutes:
   A. Complete full STAXI-2.
   B. Make rating of current anger level.

10. Inform participant that, "Now I have an arithmetic task for you to perform. You will start at 600 and then subtract 13, provide the total, then add 7 to the new total, provide the total, then subtract 13, then add 7, etc. You will need to speak out loud during this entire task. For example, you will say 600 minus 13 is ___, plus 7 is ___, minus 14 is ___, plus 7 is ___ etc. You are to work as quickly as you can

without making mistakes. Your performance will be recorded on this cassette recorder. Do you understand the task?"

Tell participant to begin and allow 180 seconds. At the end of 180 seconds say stop and turn off recorder.

While participant is performing the task, you will be seated in front of the blood pressure monitor and will take a recording of blood pressure and heart rate every 15 seconds.

11. Immediately after 180 seconds have participants
    A. Complete state items of STAXI-2 (part 1 only).
    B. Make rating of current anger level.

12. Have participant sit quietly looking at magazine for 10 minutes (be sure to time precisely). During the last 3 minutes (180 seconds) record their blood pressure and heart rate every 15 seconds.

13. At the conclusion of the 10 minutes:
    A. Complete state items of the STAXI-2 (part 1 only).
    B. Make rating of current anger level.

14. Inform participant that, "I will now give you five minutes to prepare a three-minute role play. In this role play you are to act out a confrontation with an insurance adjuster who has just denied payment of a medically necessary and potentially life-saving bone marrow transplantation for _____ (name of most important person given here). The coverage was denied because of the expense and because there are no local providers authorized by the insurance company to perform the bone marrow transplantation even though there are competent and experienced doctors who are capable of performing this procedure at the University of Utah Medical Center. Your job is to convince the insurance adjustor, and the small audience that will be rating your role play, to pay for the treatment. Do you understand the task?"

Give the participant a sheet of scratch paper and pencil to formulate his/her speech. After 5 minutes, bring audience person into lab and give audience person a Speech Rating Sheet. Tell participant to begin and allow 180 seconds. At the end of 180 seconds, say stop.

While participant is performing the task, you will be seated in front of the blood pressure monitor and will take a recording of blood pressure and heart rate every 15 seconds.

15. Immediately after 180 seconds, have participants:
    A. Complete state items of the STAXI-2 (part 1 only).
    B. Make rating of current anger level.

16. Stop the blood pressure monitor and allow the cuff to deflate. Then turn off machine and remove the finger cuff. Ask the participant how he/she is feeling. If he/she is feeling stressed or angry, encourage him/her to take a few deep breaths and relax before leaving the lab. If necessary, he/she may sit in the waiting area until relaxed and ready to leave.

Inform the participant that he/she is almost done. Thank the participant for his/her cooperation, give him/her $30, and be sure to have him/her sign the receipt book.

Give participant the last form, the qualitative and debriefing sheet, and allow him/her to complete this for in the waiting area. Be sure to identify where the form should be left upon completion.

***The order of the arithmetic and role-play tasks will be mixed up so that one participant in the I condition will do arithmetic first and the next I participant will do role-play first. Similarly, one participant in the E condition will do arithmetic first and the next E participant will do role-play first. ***

FOLSTEIN
MINI-MENTAL STATE*
EXAMINATION
Page 1 of 2

One point for each correct answer

1.	ORIENTATION	1 = Correct 0 = Incorrect
	What is the year we are in?	☐
	What season of the year is it?	☐
	What is today's date?	☐
	What day of the week is today?	☐
	What month are we in?	☐
	What state are we in?	☐
	What is your home address?	☐
	What town are we in?	☐
	Can you tell me the name of this place?	☐
	What floor of the building are we on?	☐
	SUBTOTAL CORRECT	☐
2.	REGISTRATION Ask the patient if you may test his memory. Then say the names of 3 unrelated objects, apple, penny, table, clearly and slowly, about one second for each. After you have said all 3, ask him to repeat them. This first repetition determines his score (0-3) but keep saying them until he can repeat all 3, up to 6 trials. If he does not eventually learn all 3, recall cannot be meaningfully tested. SCORE (0-3)	☐
3.	ATTENTION AND CALCULATION Ask the patient to begin with 100 and count backwards by 7. Stop after 5 subtractions (93, 86, 79, 72, 65). Score the total number of correct answers. If the patient refuses to perform this task, then ask him to spell the word "world" backwards. The score is the number of letters in correct order (e.g., dlrow = 5, dlorw = 3). It is noted that "world" is not used as an alternative upon failure of the patient to perform serial 7's, but only if patient refuses to perform serial 7's. SCORE (0-5)	☐
4.	RECALL Ask the patient if he can recall the 3 words you previously asked him to remember. Score 0-3. SCORE (0-3)	☐

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FOLSTEIN
MINI-MENTAL STATE
EXAMINATION
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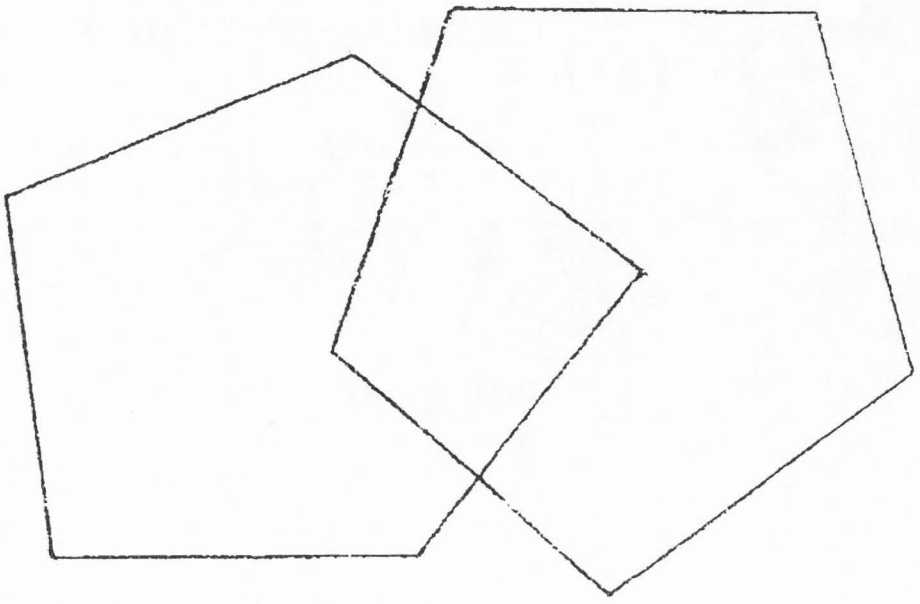
5.	**NAMING** a. Show the patient a wrist watch and ask him what it is. b. Repeat for a pencil. SCORE (0-2) ☐
6.	**REPETITION** Ask the patient to repeat this phrase after you – "No Ifs, Ands, or Buts". Allow only one trial. SCORE (0-1) ☐
7.	**3-STAGE COMMAND** Have the patient follow this 3-stage command – "Take that piece of paper in your right hand, fold it in half, and put it on the floor". Score one point for each part correctly executed. SCORE (0-3) ☐
8.	**REACTING** On a blank piece of paper print the sentence "Close your eyes" in letters large enough for the patient to see clearly. Ask him to read it and do what it says. Score 1 point only if he actually closes his eyes. SCORE (0-1) ☐
9.	**WRITING** Give the patient a blank piece of paper and ask him to write a sentence for you. Do not dictate a sentence, it is to be written spontaneously. It must contain a subject and verb and be sensible. Correct grammar and punctuation are not necessary. SCORE (0-1) ☐
10.	**COPYING** On a clean piece of paper, draw intersecting pentagons, each side about 1 inch, and ask him to copy it exactly as it is. All 10 angles must be present and 2 must intersect to score 1 point. Tremor and rotation are ignored. SCORE (0-1) ☐
	TOTAL SCORE ☐
	ASSESS level of consciousness along a continuum CODE 1 = Alert 3 = Stupor 2 = Drowsy 4 = Coma ☐
	RATER IDENTIFICATION

*Folstein, M.F., Folstein, S.E. and McHugh, P.R.: "Mini-Mental State". A practical method for grading the cognitive state of patients for the clinician. Journal of Psychiatric Research, 1975, 12, 189-198.

81184/86WW

CLOSE YOUR EYES



Appendix B:

Dependent Measures

INQUIRY CONCERNING SOCIAL AND RELIGIOUS VIEWS

The following items deal with various types of religious ideas and social opinions. We should like to find out how common they are.

Please indicate the response you prefer, or most closely agree with, by writing the letter corresponding to your choice in the right margin.

If none of the choices express exactly how you feel, then indicate the one that is closest to your own views. If no choice is possible, you may omit the item.

There are no "right" or "wrong" choices. There will be many religious people who will agree with all the possible alternative answers. Please pick only one answer for each item.

1. What religion offers me most is comfort when sorrows and misfortune strike.

   a. I definitely disagree
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

   _____

2. One reason for my being a church member is that such membership helps to establish a person in the community.

   a. I definitely disagree
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

   _____

3. The purpose of prayer is to secure a happy and peaceful life.

   a. I definitely disagree
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

   _____

4. It doesn't matter so much what I believe so long as I lead a moral life.

   a. I definitely disagree
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

   _____

5. Although I am a religious person, I refuse to let religious considerations influence my everyday affairs.

   a. I definitely disagree _____
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

6. The church is most important as a place to formulate good social relationships.

   a. I definitely disagree _____
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

7. Although I believe in my religion, I feel there are many more important things in life.

   a. I definitely disagree _____
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

8. I pray chiefly because I have been taught to pray.

   a. I definitely disagree _____
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

9. A primary reason for my interest in religion is that my church is a congenial social activity.

   a. I definitely disagree _____
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

10. Occasionally I find it necessary to compromise my religious beliefs in order to protect my social and economic wellbeing.

    a. I definitely disagree _____
    b. I tend to disagree
    c. I tend to agree
    d. I definitely agree

11. The primary purpose of prayer is to gain relief and protection.

    a. I definitely disagree
    b. I tend to disagree
    c. I tend to agree
    d. I definitely agree

    _____

12. I try hard to carry my religion over into all my other dealings in life.

    a. I definitely disagree
    b. I tend to disagree
    c. I tend to agree
    d. I definitely agree

    _____

13. Quite often I have been keenly aware of the presence of God or the Divine Being.

    a. Definitely not true
    b. Tends not to be true
    c. Tends to be true
    d. Definitely true

    _____

14. My religious beliefs are what really lie behind my whole approach to life.

    a. This is definitely not so
    b. Probably not so
    c. Probably so
    d. Definitely so

    _____

15. The prayers I say when I am alone carry as much meaning and personal emotion as those said by me during services.

    a. Almost never
    b. Sometimes
    c. Usually
    d. Almost always

    _____

16. If not prevented by unavoidable circumstances, I attend church.

    a. More than once a week
    b. About once a week
    c. Two or three times a month
    d. Less than once a month

    _____

17. If I were to join a church group, I would prefer to join (1) a Bible Study group, or (2) a social fellowship.

    a. I would prefer to join (1) _____
    b. I probably would prefer (1)
    c. I probably would prefer (2)
    d. I would prefer to join (2)

18. Religion is especially important to me because it answers many questions about the meaning of life.

    a. I definitely disagree _____
    b. I tend to disagree
    c. I tend to agree
    d. I definitely agree

19. I read literature about my faith (or church).

    a. Frequently _____
    b. Occasionally
    c. Rarely
    d. Never

20. It is important to me to spend periods of time in private religious thought and meditation.

    a. Frequently true _____
    b. Occasionally true
    c. Rarely true
    d. Never true

CAPS Typical Week Physical Activity Survey

Think about the types of activities you did in a **typical week in the past month** (see calendar provided). For each activity, note which of these activities you did by checking a box for YES or NO. Then, for each item you marked as YES, write the number of days you did the activity Monday to Friday and Saturday to Sunday, and the AVERAGE TIME in hours and minutes that you did these activities. Refer to the following INTENSITY levels before responding to each question:

Intensity levels:
Light → easy or no effort at all
Moderate → harder than light, some increase in breathing or heart rate
Vigorous → all-out effort, large increase in breathing or heart rate

Example:

Conditioning Activities

		Monday-Friday			Saturday-Sunday		
		# of days	Hours/day	Minutes/day	# of days	Hours/day	Minutes/day
Low impact aerobics health club machines bicycling, Tai Chi	[X] 1. Yes →	3	0	30	0	0	0
	[ ] 2. No						

During a typical week in _____ (Month), did you do:

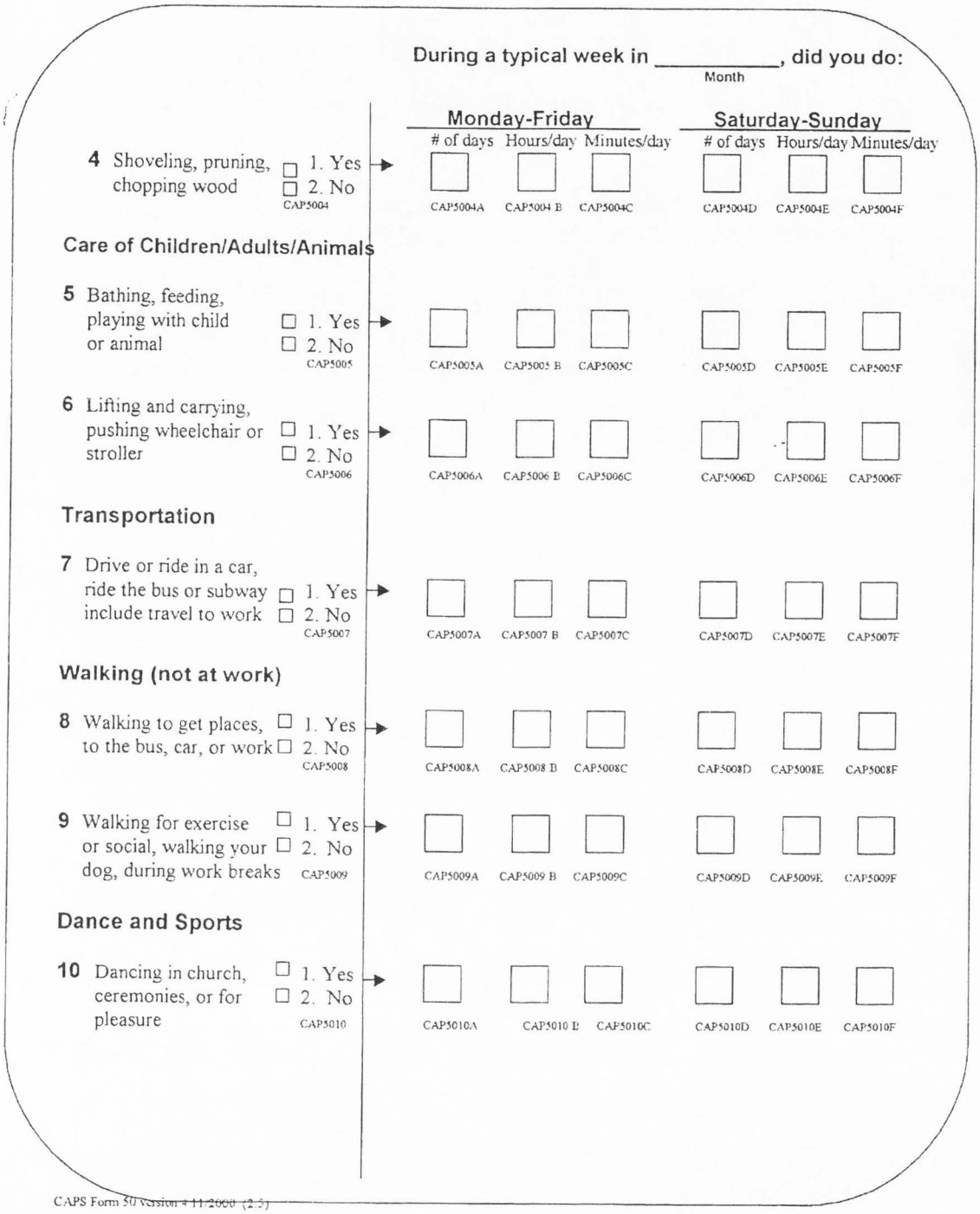
Household Activities

		Monday-Friday			Saturday-Sunday		
		# of days	Hours/day	Minutes/day	# of days	Hours/day	Minutes/day
1 Cooking, cleaning up, laundry, shopping, dusting	☐ 1. Yes ☐ 2. No CAP5001 →	CAP5001A	CAP5001B	CAP5001C	CAP5001D	CAP5001E	CAP5001F
2 Scrubbing, vacuuming, repairs, mopping, washing car	☐ 1. Yes ☐ 2. No CAP5002 →	CAP5002A	CAP5002B	CAP5002C	CAP5002D	CAP5002E	CAP5002F

Lawn/Yard/Garden/Farm

		Monday-Friday			Saturday-Sunday		
		# of days	Hours/day	Minutes/day	# of days	Hours/day	Minutes/day
3 Weeding, sweeping mowing, raking	☐ 1. Yes ☐ 2. No CAP5003 →	CAP5003A	CAP5003B	CAP5003C	CAP5003D	CAP5003E	CAP5003D

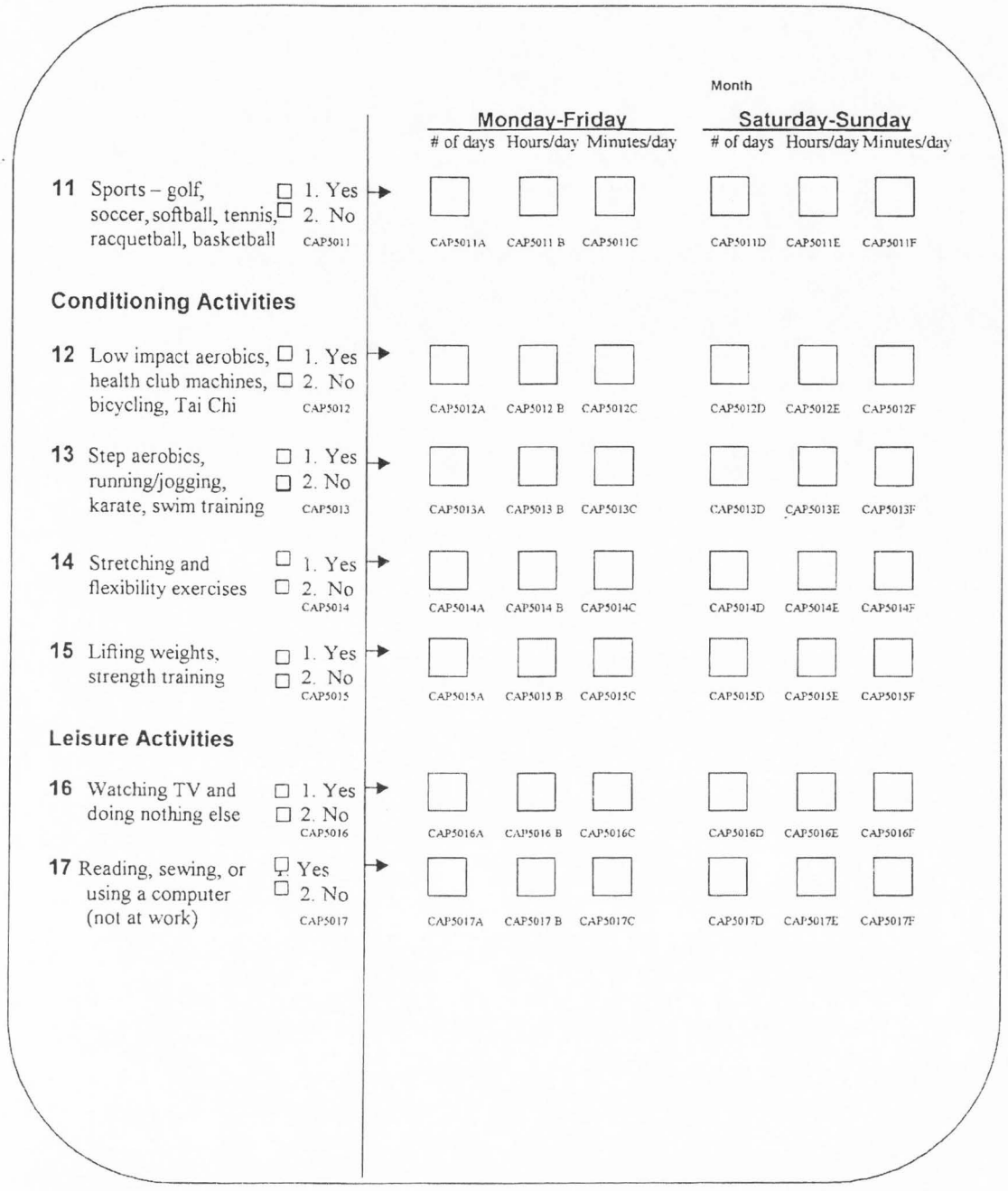
CAPS Form 50 version 4 11/2000 (1:5)



During a typical week in _____, did you do:
Month

		Monday-Friday			Saturday-Sunday		
		# of days	Hours/day	Minutes/day	# of days	Hours/day	Minutes/day
4 Shoveling, pruning, chopping wood	☐ 1. Yes ☐ 2. No CAP5004	CAP5004A	CAP5004 B	CAP5004C	CAP5004D	CAP5004E	CAP5004F
Care of Children/Adults/Animals							
5 Bathing, feeding, playing with child or animal	☐ 1. Yes ☐ 2. No CAP5005	CAP5005A	CAP5005 B	CAP5005C	CAP5005D	CAP5005E	CAP5005F
6 Lifting and carrying, pushing wheelchair or stroller	☐ 1. Yes ☐ 2. No CAP5006	CAP5006A	CAP5006 B	CAP5006C	CAP5006D	CAP5006E	CAP5006F
Transportation							
7 Drive or ride in a car, ride the bus or subway include travel to work	☐ 1. Yes ☐ 2. No CAP5007	CAP5007A	CAP5007 B	CAP5007C	CAP5007D	CAP5007E	CAP5007F
Walking (not at work)							
8 Walking to get places, to the bus, car, or work	☐ 1. Yes ☐ 2. No CAP5008	CAP5008A	CAP5008 B	CAP5008C	CAP5008D	CAP5008E	CAP5008F
9 Walking for exercise or social, walking your dog, during work breaks	☐ 1. Yes ☐ 2. No CAP5009	CAP5009A	CAP5009 B	CAP5009C	CAP5009D	CAP5009E	CAP5009F
Dance and Sports							
10 Dancing in church, ceremonies, or for pleasure	☐ 1. Yes ☐ 2. No CAP5010	CAP5010A	CAP5010 B	CAP5010C	CAP5010D	CAP5010E	CAP5010F

CAPS Form 50 Version 4 11/2000 (2.5)



Month

		Monday-Friday			Saturday-Sunday		
		# of days	Hours/day	Minutes/day	# of days	Hours/day	Minutes/day
11 Sports – golf, soccer, softball, tennis, racquetball, basketball	☐ 1. Yes ☐ 2. No CAP5011	CAP5011A	CAP5011 B	CAP5011C	CAP5011D	CAP5011E	CAP5011F
Conditioning Activities							
12 Low impact aerobics, health club machines, bicycling, Tai Chi	☐ 1. Yes ☐ 2. No CAP5012	CAP5012A	CAP5012 B	CAP5012C	CAP5012D	CAP5012E	CAP5012F
13 Step aerobics, running/jogging, karate, swim training	☐ 1. Yes ☐ 2. No CAP5013	CAP5013A	CAP5013 B	CAP5013C	CAP5013D	CAP5013E	CAP5013F
14 Stretching and flexibility exercises	☐ 1. Yes ☐ 2. No CAP5014	CAP5014A	CAP5014 B	CAP5014C	CAP5014D	CAP5014E	CAP5014F
15 Lifting weights, strength training	☐ 1. Yes ☐ 2. No CAP5015	CAP5015A	CAP5015 B	CAP5015C	CAP5015D	CAP5015E	CAP5015F
Leisure Activities							
16 Watching TV and doing nothing else	☐ 1. Yes ☐ 2. No CAP5016	CAP5016A	CAP5016 B	CAP5016C	CAP5016D	CAP5016E	CAP5016F
17 Reading, sewing, or using a computer (not at work)	☐ Yes ☐ 2. No CAP5017	CAP5017A	CAP5017 B	CAP5017C	CAP5017D	CAP5017E	CAP5017F

CAPS Form 50 version 4 11/2000 (3:5)

During a typical week in _____, did you do:
Month

Occupational Activities

18 Do you work to earn money? ☐ 1. **Yes** → *Continue to #19*
☐ 2. **No** → *Go to VOLUNTEER ACTIVITIES*
CAP5018

How many hours/week do you work to earn money in all jobs?
_____ hrs/week
CAP5018a

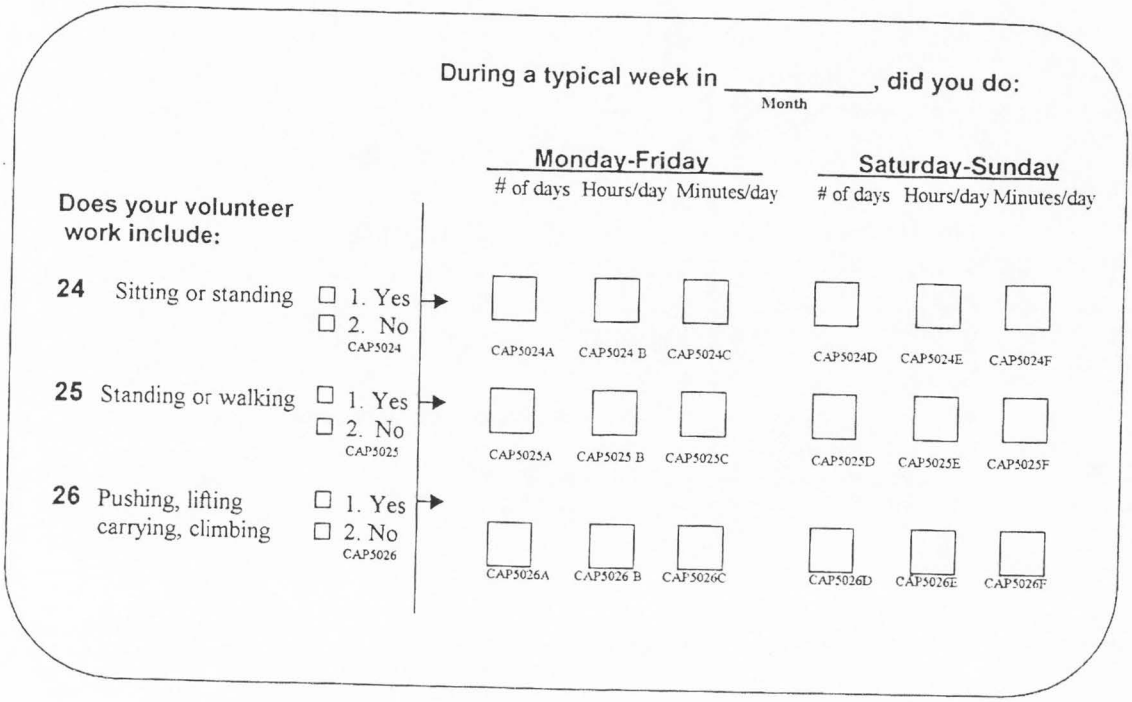
How many days/week in all jobs?
_____ days/week
CAP5018b

At work do you do:		Monday-Friday # of days	Hours/day	Minutes/day	Saturday-Sunday # of days	Hours/day	Minutes/day
19 Sitting (e.g., office/lab work)	☐ 1. Yes ☐ 2. No CAP5019	☐ CAP5019A	☐ CAP5019 B	☐ CAP5019C	☐ CAP5019D	☐ CAP5019E	☐ CAP5019F
20 Standing (e.g., copy making, assembly, clerking)	☐ Yes ☐ 2. No CAP5020	☐ CAP5020A	☐ CAP5020 B	☐ CAP5020C	☐ CAP5020D	☐ CAP5020E	☐ CAP5020F
21 Standing or walking (nursing, custodial, making deliveries)	☐ 1. Yes ☐ 2. No CAP5021	☐ CAP5021A	☐ CAP5021 B	☐ CAP5021C	☐ CAP5021D	☐ CAP5021E	☐ CAP5021F
22 Manual labor, ranch or farm labor, loading trucks	☐ 1. Yes ☐ 2. No CAP5022	☐ CAP5022A	☐ CAP5022 B	☐ CAP5022C	☐ CAP5022D	☐ CAP5022E	☐ CAP5022F

Volunteer Activities

23 Do you work as a volunteer in activities you have not yet mentioned on this survey?

☐ 1. **Yes** → *Continue to #24*
☐ 2. **No** *End*
CAP5023


During a typical week in _____, did you do:
Month
Monday-Friday
# of days Hours/day Minutes/day
Saturday-Sunday
# of days Hours/day Minutes/day
Does your volunteer work include:
24 Sitting or standing
1. Yes
2. No
CAP5024
CAP5024A CAP5024 B CAP5024C
CAP5024D CAP5024E CAP5024F
25 Standing or walking
1. Yes
2. No
CAP5025
CAP5025A CAP5025 B CAP5025C
CAP5025D CAP5025E CAP5025F
26 Pushing, lifting carrying, climbing
1. Yes
2. No
CAP5026
CAP5026A CAP5026 B CAP5026C
CAP5026D CAP5026E CAP5026F

CAPS Typical Week Physical Activity Survey Scoring Template

Household Activities

1. Days per week _____ * minutes per day_____=_____(minutes per week)
   Minutes per week_____/7=_____(minutes per day)

   Minutes per week_____ * 2.5 (light)=_____ (MET minutes per week)
   MET minutes per week_____/7=_____(MET Minutes per day)

   Days per week=_____ (total days per week)

2. Days per week_____ * minutes per day_____=_____(minutes per week)
   Minutes per week_____/7=_____(minutes per day)

   Minutes per week_____ * 4.0 (mod)=_____ (MET minutes per week)
   MET minutes per week_____/7=_____(MET Minutes per day)

   Days per week=_____ (total days per week)
   Minutes per week_____/days per week_____=_____(Min per mod active days)

SUMMARY OF HOUSEHOLD ACT by Min and Intensity

Total min/week # 1 _____+Total min/week# 2 _____=_____/7=_____(total min per day)
Total MET min/wk #1_____+Tot MET min/wk#2 _____=_____/7=_____(total MET mins per day)

Lawn/Yard/Garden/Farm

3. Days per week_____ * minutes per day_____=_____(minutes per week)
   Minutes per week_____/7=_____(minutes per day)

   Minutes per week_____* 4.0 (mod)=_____ (MET minutes per week)
   MET minutes per week_____/7=_____(MET Minutes per day)

   Days per week_____(total days per week)
   Minutes per week_____/days per week_____=_____(Min per mod active days)

4. Days per week * minutes per day=_____(minutes per week)
   Minutes per week/7=_____(minutes per day)

   Minutes per week * 6.5 (vig)=_____ (MET minutes per week)
   MET minutes per week/7=_____(MET Minutes per day)

   Days per week_____(total days per week)
   Minutes per week_____/days per week=_____(Min per vig active days)

SUMMARY OF YARD/LAWN by Min and Intensity

Total min/week #3 _____+Total min/week #4 _____=_____/7=_____(total min per day)
Total MET min/wk #3_____+Tot MET min/wk #4 _____=_____/7=_____(total MET mins per day)

Care of Others

5. Days per week_____ * minutes per day_____=_____(minutes per week)
   Minutes per week_____/7=_____(minutes per day)

   Minutes per week_____ * 2.5 (light)=_____ (MET minutes per week)
   MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)

6. Days per week _____* minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week _____* 5.0 (mod)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per mod active days)

SUMMARY OF OTHER CARE by Min and Intensity
Total min/week # 5 _____+Total min/week# 6 _____=_____/7=_____(total min per day)
Total MET min/wk #5_____+Tot MET min/wk#6 _____=_____/7=_____(total MET mins per day)

Transportation

7. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 1.0 (light)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)

SUMMARY OF TRANSPORTATION by Min and Intensity
Total min/week # 7 _____/7=_____(total min per day)
Total MET min/wk #7_____/7=_____(total MET mins per day)

Walking

8. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 3.0 (mod)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per mod active days)

9. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 3.5 (mod)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per mod active days)

SUMMARY OF WALKING by Min and Intensity
Total min/week # 8 _____+Total min/week# 9 _____=_____/7=_____(total min per day)
Total MET min/wk #8_____+Tot MET min/wk#9 _____=_____/7=_____(total MET mins per day)

Dance and Sports

10. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 5.0 (mod)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per mod active days)

11. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 7.0 (vig)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per vig active days)

SUMMARY OF DANCE and SPORTS by Min and Intensity
Total min/week # 10 _____+Total min/week# 11 _____=_____/7=_____(total min per day)
Total MET min/wk #10_____+Tot MET min/wk#11 _____=_____/7=_____(total MET mins per day)

Conditioning Activities

12. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 5.5 (mod)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per mod active days)

13. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 7.0 (vig)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per vig active days)

14. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 2.5 (light)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)

15. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 4.0 (mod)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per mod active days)

SUMMARY OF CONDITIONING ACTIVITIES by Min and Intensity
Total min/week # 12 _____+Total min/week# 13 _____+ Total min/wk # 14 +Total min/wk #15=_____/7=_____(total min per day)

Total MET min/wk #12_____+Tot MET min/wk#13 _____Total MET min/wk #14=_____+Total MET min /wk #15/7=_____(total MET mins per day)

Leisure Activities

16. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 1.0 (light)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)

17. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 1.5 (light)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)

SUMMARY OF LEISURE ACTIVITIES by Min and Intensity
Total min/week # 16 _____+Total min/week# 17 _____=_____/7=_____(total min per day)
Total MET min/wk #16_____+Tot MET min/wk#17 _____=_____/7=_____(total MET mins per day)

18. WORK = 1 yes, 2 no
19. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 1.5 (light)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)

20. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 2.5 (light)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)

21. Days per week_____ * minutes per day_____=_____(minutes per week)

Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 3.0 (mod)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per mod active days)

22. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 7.0 (vig)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per vig active days)

SUMMARY OF OCCUPATIONAL ACTIVITIES by Min and Intensity
Total min/week # 19 _____+Total min/week# 20 _____+ Total min/wk # 21 +Total min/wk #22=_____/7=_____(total min per day)

Total MET min/wk #19_____+Tot MET min/wk#20 _____Total MET min/wk #21=_____+Total MET min /wk #22/7=_____(total MET mins per day)

Volunteer Activities

23. Volunteer: 1 yes, 2 no
24. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 1.5 (light)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)

25. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 3.0 (mod)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per mod active days)

26. Days per week_____ * minutes per day_____=_____(minutes per week)
Minutes per week_____/7=_____(minutes per day)

Minutes per week_____ * 6.5 (vig)=_____ (MET minutes per week)
MET minutes per week_____/7=_____(MET Minutes per day)

Days per week=_____ (total days per week)
Minutes per week_____/days per week=_____(Min per vig active days)

SUMMARY OF VOLUNTEER ACTIVITIES by Min and Intensity

Total min/week # 24 _____+Total min/week# 25 _____+ Total min/wk # 26=_____/7=_____(total min per day)

Total MET min/wk #24_____+Tot MET min/wk#25_____Total MET min/wk #26=_____/7=_____(total MET mins per day)

SUMMARY SCORES/TOTALS

Total Household activity minutes per day	____	
Total lawn/garden activity minutes per day	____	
Total Other Care activity minutes per day	____	
Total Transportation activity minutes per day	____	
Total Walking activity minutes per day	____	
Total Dance and sports activity minutes per day	____	
Total Conditioning activity minutes per day	____	
Total Leisure activity minutes per day	____	
Total Occupational activity minutes per day	____	
Total Volunteer activity minutes per day	____	
TOTAL		____

Total Household MET activity minutes per day		____
Total lawn/garden MET activity minutes per day		____
Total Other Care MET activity minutes per day		____
Total Transportation MET activity minutes per day		____
Total Walking MET activity minutes per day		____
Total Dance and sports MET activity minutes per day		____
Total Conditioning MET activity minutes per day		____
Total Leisure MET activity minutes per day		____
Total Occupational MET activity minutes per day		____
Total Volunteer MET activity minutes per day		____
TOTAL		____

TOTAL LIGHT Min per day	TOTAL MOD Min per day	TOTAL VIG Min per day
#1_____	#2_____	#4_____
#5_____	#3_____	#11_____
#7_____	#6_____	#13_____
#14_____	#8_____	#22_____
#16_____	#9_____	#26_____
#17_____	#10_____	
#19_____	#12_____	
#20_____	#15_____	
#24_____	#21_____	
	#25_____	
Tot_____	Tot_____	Tot_____

TOT LIGHT MET Min per day	TOT MOD MET Min per day	TOT VIG MET Min per day
#1_____	#2_____	#4_____
#5_____	#3_____	#11_____
#7_____	#6_____	#13_____
#14_____	#8_____	#22_____
#16_____	#9_____	#26_____
#17_____	#10_____	
#19_____	#12_____	
#20_____	#15_____	
#24_____	#21_____	
	#25_____	
Tot_____	Tot_____	Tot_____

Min per MOD active days/Mod Active days

#2_____
#3_____
#6_____
#8_____
#9_____
#10_____
#12_____
#15_____
#21_____
#25_____
Tot_____

ACSM Mod Activity Recommendations
Days of moderate activity per week_____ (must be > or = 5) &
Minutes/day of Mod PA on active days_____(must be > or = 30) to meet ACSM criteria
MET CRITERIA Yes No

Min per VIG active days/Vig Active days

#4_____
#11_____
#13_____
#22_____
#26_____
Tot_____

Days of vigorous activity per week_____ (must be > or = 3) &
Minutes/day of Vig PA on active days_____(must be > or = 20) to meet ACSM criteria
MET CRITERIA Yes No

STAXI-2™

Item Booklet (Form HS)

Instructions

In addition to this Item Booklet you should have a STAXI-2 Rating Sheet. Before beginning, enter your name, gender, and age; today's date; years of education completed, your marital status, and your occupation in the spaces provided at the top of the STAXI-2 Rating Sheet.

This booklet is divided into three Parts. Each Part contains a number of statements that people use to describe their feelings and behavior. Please note that each Part has *different* directions. Carefully read the directions for each Part before recording your responses on the Rating Sheet.

There are no right or wrong answers. In responding to each statement, give the answer that describes you best. DO NOT ERASE! If you need to change your answer, mark an "X" through the incorrect response and then fill in the correct one.

Examples

1. ① ✗ ● ④
2. ① ● ③ ④

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Part 3 Directions

Everyone feels angry or furious from time to time, but people differ in the ways that they react when they are angry. A number of statements are listed below which people use to describe their reactions when they feel *angry* or *furious*. Read each statement and then blacken the appropriate circle to indicate how *often* you *generally* react or behave in the manner described when you are feeling angry or furious. There are no right or wrong answers. Do not spend too much time on any one statement.

Fill in ① for *Almost never*	Fill in ② for *Sometimes*	Fill in ③ for *Often*	Fill in ④ for *Almost always*

How I Generally React or Behave When Angry or Furious...

26. I control my temper
27. I express my anger
28. I take a deep breath and relax
29. I keep things in
30. I am patient with others
31. If someone annoys me, I'm apt to tell him or her how I feel
32. I try to calm myself as soon as possible
33. I pout or sulk
34. I control my urge to express my angry feelings
35. I lose my temper
36. I try to simmer down
37. I withdraw from people
38. I keep my cool
39. I make sarcastic remarks to others
40. I try to soothe my angry feelings
41. I boil inside, but I don't show it
42. I control my behavior
43. I do things like slam doors
44. I endeavor to become calm again
45. I tend to harbor grudges that I don't tell anyone about
46. I can stop myself from losing my temper
47. I argue with others
48. I reduce my anger as soon as possible
49. I am secretly quite critical of others
50. I try to be tolerant and understanding
51. I strike out at whatever infuriates me
52. I do something relaxing to calm down
53. I am angrier than I am willing to admit
54. I control my angry feelings
55. I say nasty things
56. I try to relax
57. I'm irritated a great deal more than people are aware of

Please place an "X" on the line below at the point that best represents your current level of anger.

My current level of anger is:

Not Angry

Angry as I have ever been

Appendix C:

Summary of Linear Regression Analysis

Table C-1

Summary of Linear Regression Analysis for Variables Predicting Reactivity Change Scores (N = 75)

	Predictors: ROS, Total Met Minutes, ROS * Total MET Minutes				
Change scores	*df*	*F*	Sig.	*M* square	Sum of squares
State anger change	3	2.480	.068	222.643	667.928
Regression	71			89.769	6373.619
Residual	74				7041.547
Total					
Current anger change	3	1.293	.284	654.007	1962.021
Regression	71			505.884	35917.766
Residual	74				37879.787
Total					
Heart rate change	3	1.179	.324	221.195	663.585
Regression	71			187.565	13317.129
Residual	74				13980.714
Total					
Systolic blood pressure change	3	3.329	.024	2565.541	7696.624
Regression	71			770.567	54710.241
Residual	74				62406.865
Total					
Diastolic blood pressure change	3	2.408	.074	527.260	1581.779
Regression	71			219.004	15549.283
Residual	74				17131.062
Total					