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Locus Of Control And Self-efficacy: Potential Mediators Of Stress, Illness, And Utilization Of Health Services In College Studen

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LOCUS OF CONTROL AND SELF-EFFICACY: POTENTIAL MEDIATORS OF STRESS, ILLNESS, AND UTILIZATION OF HEALTH SERVICES IN COLLEGE STUDENTS

by

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ABSTRACT

Stress has been linked to increased illness in several biologically based studies. In contrast, only a limited number of studies have assessed psychological variables related to stress, with self-efficacy and locus of control serving as potentially important variables. Thus, the current study investigated the mediating effects of self-efficacy and locus of control in the relationship between stress, psychological and physical symptoms, and the utilization of health services in college students. Results suggested that stress was correlated positively with symptoms. External locus of control was correlated positively with stress and symptoms, and self-efficacy was correlated negatively with stress and symptoms. Further, structural equation modeling was used to test two separate models. The first model examined the relationships between stress and symptoms and between symptoms and utilization of health services. Although the path coefficients suggested that there were direct relationships, the data did not adequately fit this model. The second model examined the potential mediational effects of locus of control and self-efficacy on the relationship between stress and symptoms. The path coefficients for the second model were consistent with a mediation effect for locus of control in the relationship between stress and symptoms; however, when this model was tested for full mediation, the data did not fit the model. The results suggested that locus of control may only be a partial mediator in the relationship between stress and illness. These results highlight the importance of having future studies examine and identify potential mediators of the stress and illness link. Implications for reducing health care costs and promoting better mental and physical health are discussed.

This dissertation is dedicated to Arazais Oliveros. Throughout graduate school, we studied, played, traveled, laughed, and cried together. Your endless encouragement and support over the last seven years has assisted me in reaching my goals. You have been my voice of reason and have become my closest friend and confidant. You have taught me the true meaning of friendship and I appreciate you more than you will ever know.

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TABLE OF CONTENTS

CHAPTER ONE: INTRODUCTION

Stress

The term *stress* was used as early as the 14th century to refer to hardships, affliction, or adversity (Lazarus & Folkman, 1984). It was not until the 20th century, however, that stress was conceived as a basis of ill health (Lazarus & Folkman, 1984). At that time, stress became a topic of research due to its significant effects on soldiers in combat during World War II and the Korean War (Lazarus & Folkman, 1984). Stress was defined initially as being a stimulus or response. Stimulus definitions focused on environmental events (e.g., illness, natural disasters) and suggested that certain events are inherently stressful, whereas response definitions referred to stress as a state of being where individuals were under stress or reacting with stress (Lazarus & Folkman, 1984).

Although these definitions provided a foundation for understanding stress, they were not comprehensive. Defining stress as a stimulus or response does not take into account the relationship that exists between individuals and their environment. Furthermore, this definition of stress does not account for the vast individual differences that exist in how individuals react to or cope with similar situations. Thus, additional explanations were needed. Taking this into account, Lazarus and colleagues (e.g., Folkman, Schaefer, & Lazarus, 1979; Lazarus, 1966; Lazarus & Folkman, 1984) developed a cognitively oriented theory of stress and coping. In particular, Lazarus (1966) defined stress as a relationship between individuals and their environment. Such stress is appraised by individuals as relevant to their own well-being when their resources are either strained or exceeded. This strain can endanger individuals' well-being (Folkman, 1984; Folkman & Lazarus, 1985). As part of this conceptualization, stress is characterized as a relational process rather than as a stimulus (e.g., an exam, a financial

obligation) or a response (e.g., physiological arousal). Including the relational aspect in the definition of stress was an important precursor for beginning to understand how stress impacted individuals' functioning. Lazarus (1966) also described stress as process oriented, in that individuals and their environment are in a bidirectional relationship that is changing constantly. Rather than viewing stress as originating from a source, or a "stressor", it is viewed as part of a relationship where individuals and their environment are influencing one another actively (Folkman, 1984). In summary, it was this more comprehensive definition of stress that provided the basis for research examining the effects of stress at the individual level.

Given this relational and process oriented definition of stress, Lazarus and Folkman (1984) proposed that, in studying individuals' differences in reaction to and coping with stress, it is the meaning that events have for different individuals that must be considered. Furthermore, it was recognized that how individuals coped with stress, rather than the stress itself, was related more closely to how they functioned (Lazarus & Folkman, 1984). Thus, the concept of cognitive appraisal was described to explain these differences. Cognitive appraisal has been described as the evaluative cognitive processes that intervene between the encounter and the reaction (Lazarus & Folkman, 1984). Thus, the focus is on the value and meaning of stress, with the purpose of evaluating the significance of a situation in relation to individuals' well-being (Lazarus & Folkman, 1984). Recognizing the importance of the meaning of stress to the individual allowed for a broader view of stress to be examined that included the individuals' cognitive processes. Furthermore, defining the cognitive processes involved in accounting for the individual differences in how individuals cope with stress was an important foundation for understanding these differences.

Lazarus and Folkman (1984) described different types of cognitive appraisal (i.e., primary and secondary). In primary appraisal, individuals evaluate situations with regard to their own well-being and determine whether situations are irrelevant, benign-positive, or stressful (Folkman & Lazarus, 1985). It is these judgments that help individuals to determine the significance level of a situation with regard to their own well-being. The situation may be viewed as non-significant (i.e., irrelevant), having a positive outcome and not exceeding individuals' resources (i.e., benign-positive), or as stressful. Furthermore, stressful appraisals are characterized by harm-loss (i.e., injury already has been done), threat (i.e., there is a potential for harm-loss), or challenge (i.e., there is a potential for growth or mastery; Folkman, 1984; Folkman & Lazarus, 1985). The primary appraisals of harm/loss, threat, and challenge are not mutually exclusive, and aspects of each can be involved in any given situation (e.g., taking an exam can involve threat and challenge emotions; Folkman, 1984).

In addition, primary appraisals are shaped by individuals' characteristics, such as their beliefs and commitments (Folkman, 1984). Beliefs, or preexisting notions about reality that can be general or specific, are related to primary appraisals and play a significant role in the interaction between individuals and their environment. Furthermore, stress levels are related to individuals' general beliefs about control, or the extent to which individuals assume that they can control outcomes judged as important or significant with regard to their well-being. Commitments represent what is important or what has meaning to individuals and can involve values and ideals (e.g., becoming a more well-rounded individual) or specific goals (e.g., passing an exam; Folkman, 1984). With regard to stress, any encounter that harms or threatens a strongly held commitment will be evaluated as significant. Thus, commitments determine the stakes involved in a given situation (Folkman, 1984). For example, if passing a particular exam

is seen as necessary in order to graduate or reach a professional goal, then students may perceive their entire careers to be at stake. Thus, the level of stress experienced in that particular situation may be much higher than that experienced when taking other exams in the past.

Primary appraisals also are shaped by situational factors, such as how familiar the situation is, the uncertainty of the event, the timing of the event, and the clarity of the expected outcomes. In an unfamiliar or novel situation, individuals are likely to make appraisals based on either similar past experiences or general knowledge (Lazarus & Folkman, 1984). Thus, a situation will be appraised as threatening only if some aspect has been connected with harm previously. Event uncertainty, which introduces the notion of probability, also affects individuals' primary appraisals (Lazarus & Folkman, 1984). This relationship is a complex interaction between the nature of the event and the likeliness of occurrence. For example, if the event is negative and the probability given for occurrence is high (e.g., an 85% chance of tumor reoccurrence), then the appraisal of threat will likely also be high. In contrast, if the probability of occurrence of a positive event is high (e.g., I only need 40% on the final exam to pass the class), the appraisal of threat will be low.

Furthermore, the effects of timing on primary appraisals involve imminence and temporal uncertainty of events (Lazarus & Folkman, 1984). The imminence or proximity of an event plays a role in the intensity of the individuals' appraisals. Individuals' appraisals of threat would be higher when they get closer to the actual timing of stressful events (e.g., there would be higher threat appraisal on the day before the exam relative to two weeks prior to the exam). Temporal uncertainty, or not knowing when the event will occur, also plays a role in individuals' primary appraisals (Lazarus & Folkman, 1984). Thus, temporal factors must be taken into account when studying the differences in how individuals respond to and cope with stress.

Finally, the clarity of the expected outcomes is important in the development of individuals' primary appraisals. If the outcome is ambiguous, then there is more room for individuals' characteristics to determine how they appraise a situation (Lazarus & Folkman, 1984). For example, ambiguity can intensify threat if individuals are more prone to be threatened or if another cue indicates potential harm. In contrast, it can reduce threat by allowing individuals to make alternative expectations about the outcome of an event, which can be either positive or negative (Lazarus & Folkman, 1984). Thus, there is a complex interaction between individuals' level of uncertainty with regard to an outcome and their own characteristics that also plays a role in their response to stress. Furthermore, this interaction is important in gaining an accurate understanding of the multifaceted aspects of how stress impacts individuals' functioning.

In contrast to primary appraisal, secondary appraisal is the evaluation of the coping resources and options that individuals have available. For example, secondary appraisals include the actions that individuals can take in response to the primary appraisals of harm/loss, threat, or challenge. Secondary appraisals also include several different types of resources, such as those that are physical (e.g., health), social (e.g., support systems), psychological (e.g., self-esteem, morale), and material assets (e.g., money). In addition to resources, situational appraisals, or individuals' beliefs about the possibilities for control in a specific encounter, are included in secondary appraisals. Situational appraisals involve individuals' evaluations of the demands of the situation, along with their available coping resources, options, and ability to implement effective coping strategies (Folkman, 1984). Highlighted by secondary appraisal is the importance of individuals' available resources, whether these resources are perceived or actual, with regard to how individuals respond to situations deemed stressful.

Control

As part of the appraisal process, the role of personal control is important in understanding stress and coping, particularly as it is described within Lazarus' cognitively oriented theory of stress. Beliefs about the extent to which individuals can control outcomes of importance (i.e., primary appraisals) and the appraisal of the possibilities for control in a specific stressful encounter (i.e., secondary appraisals) play a significant role in the relationship between stress and coping (Lazarus, 1966). Given this relationship, individuals' perceptions of the control that they have over stressful situations may serve as an important predictor of their responses to stress.

For example, one of the most critical variables involved in individuals' psychological health and well-being is control (Shapiro, Schwartz, & Astin, 1996). Individuals' feelings that they are in control of their own internal psychological environment (i.e., cognition, beliefs, emotions, and thoughts) and its outward behavioral expression are associated with feelings of psychological well-being (Shapiro et al., 1996). In addition, impairment of control has been implicated as one of the core features in several psychological disorders (e.g., Anxiety Disorders, Eating Disorders, Depression). Research has suggested that psychologically healthy individuals have a greater sense of control than do those suffering from psychological distress or impairment. Further, these healthy individuals have been found to overestimate the amount of control that they have in a situation, to be more optimistic about their ability to achieve control, to overestimate their invulnerability, and to underestimate risk in certain situations (Lewinshon, Mischel, Chaplin, & Barton, 1980; Seligman, 1991; Taylor & Brown, 1988). These healthy individuals also tend to make explanatory attributions to protect their sense of control when behavioral control efforts are not successful. Thus, they tend to attribute unsuccessful outcomes

to external rather than internal factors (Seligman, 1991). In summary, psychological functioning appears to be, at least in part, determined by individuals' beliefs about control. Therefore, it may be that beliefs about control are important predictors of individuals' psychological functioning.

Such findings also extend to those experiencing physical illnesses. In individuals experiencing physical illnesses, a sense of control has been related to positive psychological outcomes (Shapiro et al., 1996). In general, research has shown that those who believe that there is something they can do about their disease or the resulting stresses have a more positive psychological adaptation than do those who do not have such beliefs (Shapiro et al., 1996). For example, personal control experienced by cancer patients has been linked to increases in self-esteem, quality of life, and positive mood (Cunningham, Lockwood, & Cunningham, 1990; Lewis, 1982). In contrast, a relationship between lack of control and anxiety and depression in cancer patients has been documented (Derogotis et al., 1983; Greer & Silberfarb, 1982). In addition to psychological symptoms, individuals' sense of control has been related to physical effects in those experiencing physical illnesses (Shapiro et al., 1996). For example, a study done with nursing home residents found that those who were taught internal control strategies tended to live longer when compared to those in a control group (Alexander, Langer, Newman, Chandler, & Davies, 1989). This research highlights the importance of the impact that beliefs about control can have on physical functioning. Similar to the relationship between beliefs about control and psychological functioning, presumably these beliefs may in fact be a predictor of individuals' physical functioning.

Although it was a widely held belief that having control in a stressful encounter is stress reducing and not having control is stress inducing (Folkman, 1984; Shapiro et al., 1996), research has discovered that the opposite is sometimes true. That is, having control in a situation

can increase stress, and not having control can decrease stress (Averill, 1973; Thompson, 1981). In fact, individuals who have too many beliefs in their own ability to control events and those who have too high a need for control have been found to be at greater risk for cardiovascular difficulties (Shapiro et al., 1996). One reason for the discrepancy may be a mismatch between the amount of control available and personal variables, such as behavioral competencies (e.g., skill and ability), control cognitions (e.g., self-efficacy and responsibility), and control motivation (e.g., desire for control; Shapiro et al., 1996). Thus, the complexity of the relationship between the effects of a stressful situation and individuals' appraisals of personal control needs to be acknowledged. Furthermore, assumptions that having control leads to positive outcomes and that not having control leads to negative outcomes may not always be accurate.

Several reasons have been proposed for why control may lead to negative outcomes (Shapiro et al., 1996). When events are beyond individuals' personal control, problems may be exacerbated by their persistent efforts at control, a strong sense of self-efficacy, or a high desire for control. Negative consequences (e.g., cardiovascular disease, restrictive eating disorders) also can result from successful efforts at gaining control. Furthermore, individuals' beliefs that they are in control, and therefore immune to risks and hazards, may reduce long-term health promoting efforts and also can lead to increased anxiety and self-blame. Thus, individuals' beliefs that they are in control can often be as important as actually having control (Shapiro et al., 1996). Therefore, it is critical to investigate individuals' self-perceptions regarding control in the context of stressful situations.

Locus of Control

The concept of locus of control, derived from Rotter's social learning theory, was identified as a way of studying individuals' self-perceptions of control (Rotter, 1966). In his seminal monograph, Rotter (1966) discussed individual differences in how individuals regard rewards versus reinforcements. Rotter (1966) proposed that the degree to which individuals feel that rewards are contingent on their own behavior or, in contrast, are controlled by forces not under their own control determines how they will view rewards or reinforcements. Thus, individuals' beliefs about the causal relationship between their own behavior and the rewards that they receive are the key factors in determining their own self-perceptions of control in a given situation (Rotter, 1966). Thus, the importance of individual characteristics is highlighted with regard to perceptions of control.

When events are not viewed as the result of individuals' own actions, then individuals' label themselves as having beliefs in external control and perceive the events as the result of luck, chance, fate, or as under the control of powerful others. In contrast, when individuals perceive events as contingent upon their own behavior, they label themselves as having beliefs in internal control. Rotter (1975) proposed that these beliefs develop from specific past experiences and reinforcement histories. Thus, similar to individuals' reaction to stressful encounters, individuals' learning histories are also important in determining the origin to which they will attribute significant outcomes. In particular, those who have experienced and been reinforced for successful control attempts in the past will hold more beliefs of internal control than those with unsuccessful past attempts. Finally, Rotter (1975) suggested that these generalized control expectancy beliefs have their greatest influence when a situation is new or ambiguous and void of any preconceived notions on how to act or react. Again, similar to an individuals' response to

stress, there appears to be a complex interaction between individuals' level of uncertainty with regard to a situation and their control beliefs. Furthermore, this interaction is important in gaining a more in depth understanding of how individuals' beliefs about control impact their functioning.

Initially, locus of control was viewed as a one-dimensional construct ranging on a continuum from internal to external (Rotter, 1966). Internal locus of control referred to individuals' beliefs that events were contingent on their own behavior. In contrast, external locus of control referred to individuals' belief that events were not dependent on their own behavior and were instead dependent upon luck, fate, or powerful others. Research has revealed that locus of control should be defined with more than one dimension, however (Levenson, 1974, 1981). Thus, this construct may be better conceptualized as multidimensional in nature and as no longer falling on a continuum (Levenson, 1974, 1981). This multidimensional conceptualization has been composed of three independent dimensions of locus of control (i.e., internal locus of control, powerful others, and chance), with the later two dimensions derived from a division of the external dimension (Levenson, 1981). To examine this new conceptualization, Levenson (1974) developed a scale consisting of three separate subscales so that these three dimensions could be measured independently. The identification of the three independent dimensions of locus of control allowed for further development and examination of this construct. The locus of control concept also has been adapted to understanding specific health behaviors as a result of findings that individuals' locus of control beliefs could predict health behaviors (Wallston, Wallston, & DeVellis, 1978).

Health Locus of Control Beliefs

As noted above, locus of control beliefs have been related significantly to health behaviors and outcomes (AbuSabha & Achterberg, 1997; Murphy, Thompson, & Morris, 1997; Steptoe & Wardle, 2001). Thus, an important construct in understanding and predicting health behaviors may be a more applied use of locus of control, or what has been referred to as health-related locus of control. To further this line of research, the general locus of control construct was adapted to address specific health-related behaviors, resulting in a health-related locus of control scale (Wallston et al., 1978). This measure was created using Levenson's three-factor model of locus of control beliefs. Similar to the general locus of control construct, the three independent dimensions included internal locus of control, powerful others (e.g., doctors, nurses), and chance (Wallston et al., 1978). Internal health-related locus of control was defined as the extent to which individuals believe that they control their health. Powerful others health-related locus of control was conceptualized as the extent to which individuals believe that other important people, such as doctors and nurses, control their health. Finally, chance health-related locus of control is the extent to which individuals believe that fate, luck, or chance events control their health (Wallston et al., 1978). Defining this construct further provided the foundation for examining the relationship between individuals' health-related locus of control beliefs and their own physical and psychological functioning.

Studies assessing health-related locus of control beliefs have found that these beliefs are related to health outcomes, such as the development of health behaviors and treatment compliance, and the adjustment to health problems (Murphy et al., 1997; Wallston et al., 1978). More specifically, internal health-related locus of control has been associated positively with health knowledge and attitudes, psychological adjustment, health behaviors, and better health,

whereas beliefs in more external sources of health have been associated with negative health behaviors and poor psychological adjustment (Aruffo, Coverdale, Pavlik, & Vallbona, 1993; Benassi, Sweeney, & Dufour, 1988; Smith, Dobbins, & Wallston, 1998; Vandervoort, Luis, & Hamilton, 1997; Waller & Bates, 1992). This line of research suggested that, in examining individuals' functioning with regard to their locus of control beliefs, it is important to separate general beliefs about individuals' overall level of control from specific beliefs about their performance in relation to a specific context or situation. In other words, there is a difference between locus of control as a generalized expectancy (Rotter, 1966) and individuals' beliefs about their ability to control a specific area, what Bandura (1977) called "self-efficacy". For example, although individuals may have a high internal health-related locus of control, believing that they are in control of their own health, they may not feel efficacious with regard to performing a specific treatment regimen or procedure (e.g., self-injections required for patients with diabetes) that is essential to maintaining their own health.

Locus of Control and Self-Efficacy

Bandura's (1977) construct of self-efficacy, or individuals' subjective assessment that they have the internal and external resources to cope with a given or hypothetical situation, also has been conceptualized as the "self-appraisal of competence and control". Bandura (1977) proposed that individuals' expectations of personal efficacy determine whether coping behavior will be initiated, the amount of effort that they will expend, and how long they will sustain the effort in the face of obstacles or aversive experiences. The relationship between individuals' perceived self-efficacy and their beliefs regarding their control over stressors on components of the immunological system has been examined (Wiedenfeld et al., 1990). Results revealed that perceived self-efficacy moderated immunological system responses. When individuals felt that

they were gaining self-efficacy over a stressor, the effects of the stressor on the immune system decreased. Thus, individuals' feelings that they could exercise self-efficacy and control a stressor reduced the negative effects of stress on the immune system. This study supported the protective function of self-efficacy in reducing the body's response to stress, in that self-efficacy was found to moderate the relationship between stress and immune system response. A limitation to this study, however, was the use of experimental procedures, rather than real world procedures, to generate different levels of perceived self-efficacy (Wiedenfeld et al., 1990).

In addition, locus of control and self-efficacy are two constructs that have been studied together recently with regard to the relationship between distress and illness (Shelley & Pakenham, 2004). In an examination of the role of external health-related locus of control and general self-efficacy in moderating the effects of chronic versus acute illness on distress, it was found that external health-related locus of control combined with self-efficacy moderated illness-related psychological distress (Shelley & Pakenham, 2004). Given the link that has been established between self-efficacy, locus of control, and illness-related distress, an investigation into the mediating effects that self-efficacy and locus of control may have on the established relationship between stress and illness is warranted.

Stress, Locus of Control, and Illness

Given the established relationship between stress and locus of control, one study took the investigation a step further and assessed the relationship between stress, locus of control, and physical illness (Horner, 1996). This study assessed the extent to which the relationship between locus of control beliefs and reported physical illness depend on stressors and neuroticism in an adult population (Horner, 1996). Findings revealed that external locus of control was associated with higher levels of actual stressors, higher levels of neuroticism, the use of more emotion-

directed coping behaviors, and higher levels of perceived stress (Horner, 1996). Further, reported illness was predicted by locus of control, neuroticism, and the stressors examined in the study. This study concluded that external locus of control beliefs are related to the experience of illness, suggesting a strong link between external locus of control and illness (Horner, 1996). These findings support the link between stress and illness and provide additional information with regard to the relationship between locus of control and illness. More specifically, these findings suggest that, in addition to stress, locus of control may be a predictor of physical illness. Furthermore, the importance of examining the relationship between stress, locus of control, and illness is highlighted.

A recent study also assessed the relationship between perceived control and biological and subjective stress responses. The potential moderating effect of locus of control on this relationship also was examined (Bollini, Walker, Hamann, & Kestler, 2004). In this study, a stress induction task was used where perceived control over a task that was completed as part of the study was manipulated. Findings revealed that those with a high external locus of control reported more psychological and physical problems and less life satisfaction and efficacy. In addition, these individuals perceived themselves as having less control, being more susceptible to external influences, and being more responsive to stress (Bollini et al., 2004). In this same study, locus of control was found to moderate the relationship between control and cortisol response (i.e., a biological stress response), but only when the participants perceived that they had control over the task being performed. Specifically, among those who perceived that they had more control, those with more internal locus of control scores evidenced a lower biological response to stress. In contrast, those who felt that they had no control did not differ in their cortisol response as a function of locus of control. Thus, when individuals with an internal locus of control

perceived that they had control, they evidenced an attenuated biological stress response. No direct relationship between locus of control and this biological response to stress was found, however (Bollini et al., 2004). Limitations of this study include the use of an induced stress condition along with laboratory controlled perceptions of control, as opposed to real-world conditions, which may be related more directly to individuals' everyday functioning (Bollini et al., 2004).

Stress, Control, and Outcomes in College Students

A few studies have begun to examine the relationships among stress, locus of control, health behaviors, and other outcomes in college students (Abouserie, 1994; Gadzella, 1994; Oaten & Cheng, 2005). For example, a study assessing the sources and levels of stress (i.e., academic and life stress) in relation to locus of control and self-esteem in college students revealed that examinations and examination results were the most important causes of stress for these students (Abouserie, 1994). In addition, this study suggested that 88% of college students who were stressed by examinations fell in the moderately to severely stressed categories, with female students reporting more stress than male students. Thus, college students, particularly female college students, experienced a high incidence of stress. With regard to the relationship between stress, locus of control, and self-esteem, findings from this study revealed that those with external locus of control beliefs were more stressed than those with internal locus of control beliefs. Further, those with high self-esteem were less stressed than were those with low self-esteem (Abouserie, 1994). These findings highlight the importance of examining relationships among constructs such as stress and locus of control in the college student population.

Another stress-related study using a college student population assessed for differences in locus of control among three stress groups (mild, moderate, and severe; Gadzella, 1994). No

differences among these groups were found on the internal locus of control scale, but there were significant differences on the external locus of control scales for both powerful others and chance. Results indicated that those experiencing higher levels of stress were more likely to perceive that they were influenced by other people and by luck in their decisions and behaviors than those experiencing lower levels of stress. Thus, Gadzella (1994) concluded that those who were external scorers were more likely to experience higher levels of stress. Findings suggest that the relationship among stress and locus of control may be multifaceted. In particular, it may be that different levels of stress are related to the different dimensions of locus of control in unique ways.

Finally, a more recent study assessed the effects of academic stress in undergraduate students on self-control (Oaten & Cheng, 2005). This study was the first direct test of real world stress on self-regulatory behavior. Data were collected at two time periods, four weeks prior to the examination period and again during the examination period. In addition, a control group consisting of students on semester break was included in the study. Results revealed that the anticipation of academic examinations depleted self-control strength and produced subsequent failures in self-control behavior (Oaten & Cheng, 2005). As stress increased, self-control decreased. This study also suggested that, as stress increased, negative health behaviors increased, and positive health behaviors decreased. The authors concluded that the loss of control over behavior appeared to be a major cost of coping with stressful environmental demands (Oaten & Cheng, 2005). Thus, a complex relationship also may exist between different types of stress, control, and health behaviors.

Studies assessing the relationship between stress and control in college students, although limited in number, have supported the link between external locus of control and stress as well as

between the negative effects of exam stress and individuals' self control and health behaviors. Given the links established between stress, locus of control, and negative physical outcomes, further research is needed to assess for mediators of these relationships using a real world stress condition.

Utilization of Health Services

Another potential outcome for the relationship between stress and illness is the utilization of health services. Since stress has been implicated in the causation of illness (Horner, 1996), it presumably also is related indirectly to the utilization of health services. Further, given the relationship between health-related locus of control and health behaviors, an investigation into the mediating effects of health-related locus of control in the relationships among stress, illness, and utilization of health services is warranted. For example, Roghmann and Haggerty (1973) found that increased utilization of certain types of services was associated with minor, everyday stresses. Another study found a significant positive relationship between psychological distress and the utilization of primary health care services, even after controlling for various demographic variables that included health status (Tessler, Mechanic, & Dimond, 1976).

In another examination of the relationship between stress and the utilization of health services, a diary method was used that consisted of a brief one-page paper that assessed daily stressful events, physical symptoms, and participants' utilization of health services (Gortmaker, Eckenrode, & Gore, 1982). After controlling for different variables, including SES, perceived health status, and health attitudes (which included a health-related locus of control scale), the findings suggested that stress does affect the utilization of health services (Gortmaker et al., 1982). Thus, these studies supported a link between stress and the utilization of health services. Few studies have assessed the relationship between stress and the utilization of health services in

the context of other variables, however. What these studies do not provide is an examination of the mechanism by which stress is related to the utilization of health services.

The Current Study

Most studies examining the relationship between stress and illness assess the biological phenomena that mediate this relationship. As a result, the link between stress and decreased immune functioning has been well documented (Segerstrom & Miller, 2004). Investigations into the psychological phenomena that mediate stress and the relationship between psychological and physical functioning also are needed, however. Thus, the examination of locus of control and self-efficacy in this study will make a significant contribution to the research literature on stress, illness, and the utilization of health services.

Further, only a few studies thus far have examined stress in undergraduate college students. There has been support that the most significant source of stress for college students was academic examinations (Abouserie, 1994). In addition, the literature supported that those with more external locus of control beliefs experienced higher levels of stress than those with more internal locus of beliefs (Abouserie, 1994; Gadzella, 1994). Increases in stress also have been linked to decreases in self-control (Oaten & Cheng, 2005). With regard to self-efficacy and stress, findings in previous research demonstrated that self-efficacy moderated the effects of stress on immune functioning as well as the effects of illness on distress (Shelley & Pakenham, 2004; Wiedenfeld et al., 1990). Further, with the constant increases in health care costs, the importance of assessing the utilization of health care services as a result of the stress and illness link is also important.

To the author's knowledge, no study has examined locus of control and self-efficacy as mediators of the relationship between stress, psychological and physical functioning, and the

utilization of health services, particularly in a college student sample. As a result, the purpose of the current study was to investigate the mediating effects of general locus of control, health-related locus of control, and self-efficacy on the relationship between real world academic stress, psychological and physical functioning, and the utilization of health services in a college student sample. In addition, a hypothesized model of the relationships among these constructs will be examined.

Hypothesis one was that stress would be related significantly and positively to increased reports of psychological and physical symptoms (i.e., illness) and the utilization of health services. Hypothesis two was that external locus of control and negative self-efficacy would be related positively to increased stress, increased psychological and physical symptoms (i.e., illness), and increased utilization of health services. Hypothesis three was that there would be a direct relationship between stress and illness and between illness and utilization of health services. Hypothesis four was that locus of control and self-efficacy would mediate the relationship between stress and illness when stress levels were high. Thus, it was expected that increased internal locus of control and increased self-efficacy would attenuate the relationship between stress and illness, thereby decreasing indirectly the utilization of health services. To examine these hypotheses, college student participants completed measures at two points in time (i.e., first, at the start of the semester and, second, at one-week before final examinations).

CHAPTER TWO: METHOD

Participants

Participants at Time 1 were 211 undergraduate students attending a large southeastern state university. A majority of the data was collected on a regional campus affiliated with the university. All participants were recruited directly through their psychology undergraduate courses and earned extra credit for their participation. The average age of the participants was 24.11-years (*SD* = 6.75-years). The participants were predominantly female (73 %; 27% male). Although a large proportion of the participants were Caucasian (69.7%), several participants were Hispanic American (13.7%), African American (9.5%), or from another ethnic background (7.1%). With regard to class standing, a majority of the participants were Juniors (52.1%), whereas a smaller number were Seniors (27.5%), Sophomores (10.9%), Freshmen (7.6%), or of some other class standing (1.9%). In addition, a majority of the students were classified as full-time students (79.5%), taking an average of 12.57 credit hours (*SD* = 2.86). Further, a majority of participants reported that they had a GPA of 3.0 or higher (77.7%; *M* = 3.26; *SD* = .42). A majority of the students also reported that they had no exams scheduled within the following week (73%). With regard to long-term physical and mental health, a small number of the participants (16.6%) reported that they had been diagnosed with a chronic physical illness, and several participants (37.9%) reported that they had sought out mental health services at some time in their lives.

Participants at Time 2 were 159 of the same undergraduate students that had participated in the Time 1 data collection period. Participants earned additional extra credit for participation at Time 2. The average age of the participants at this time period was 24.8-years (*SD* = 7.06-years). The participants were predominantly female (77 %; 23% male). Again, the majority of

participants were Caucasian (68%), with a smaller number of participants categorizing themselves as Hispanic American (10.6%), African American (12.6%), or as being from another ethnic background (8.8%). With regard to class standing, a majority of the participants were Juniors (51.6%), whereas a smaller number were Seniors (32.1%), Sophomores (8.2%), Freshmen (6.9%), or of some other class standing (1.2%). Again, a majority of the students were classified as full-time (74.1%), taking an average of 12.20 credit hours (*SD* = 3.07). The majority of participants reported a GPA of 3.0 or higher (78.8%; *M* = 3.26; *SD* = .44). The majority of the students also reported that they had one or more exams scheduled within the following week (74.3%; *M* = 3.11; *SD* = 1.25). With regard to participants' long-term physical and mental health, a small number of the participants (15.1%) reported that they had been diagnosed with a chronic physical illness, and several participants (37.2%) reported that they had sought out mental health services at some time in their lives. Demographics for participants at Time 1 and Time 2 can be found in Table 1.

Measures

Stress. Participants completed a modified version of the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) as a measure of general stress. This scale is the most widely used psychological instrument for measuring the perception of stress. It is a measure of the degree to which situations in individuals' lives are appraised as stressful. This scale consists of 14 items that are scored on a 4-point Likert-type scale, ranging from 0 = *never* to 4 = *very often*, and result in a total score. Although the original scale assessed the frequency of symptoms within the past month, the current investigation used the same 14 items to assess the frequency of symptoms within the past week. This measure was chosen based on its adequate psychometric properties in previous studies, with reliabilities reported in the acceptable range (α

=.84 to .86). In this study, reliabilities for the PSS were also in the acceptable range (α =.87 to .89).

Participants also completed the Academic Stress Scale (ASS; Kohn & Frazer, 1986) as a measure of academic stress. This scale assesses the degree to which specific events related to academic functioning are rated as stressful. The scale consists of 35 items that are rated on a 5-point Likert-type scale. These items yield a total score and three subscale scores, for Physical Stressors, Psychological Stressors, and Psychosocial Stressors. The three subscale scores were used in the current study. Reliabilities in the acceptable range (α =.73 to .84) were reported for all three subscales in previous studies. In this study, reliabilities for the three subscales of the Academic Stress Scale also were in the acceptable range (α =.75 to .92).

Locus of Control. Participants completed the Internal, Powerful Others, and Chance Locus of Control Scale (Levenson, 1974) as a measure of general locus of control. This measure is one of the most widely used general locus of control scales (Furnham & Steele, 1993). This scale is three dimensional, consisting of 24 items and three independent scales (i.e., Internal, Powerful Others, and Chance scales). Each item is scored based on a 6-point Likert-type scale. Total scores are computed for each scale independently. Acceptable internal consistency reliabilities for all three scales, ranging from .64 to .78, have been reported in previous studies (Levenson, 1974). In the current study, acceptable internal consistency reliabilities were found for the Powerful Others and Chance scales (α =.79 to .83), whereas the reliabilities for the Internal scale were lower (α =.54 to .67).

Health-Related Locus of Control. The Multidimensional Health Locus of Control Scale (MHLC; Wallston et al., 1978) was completed by participants as a measure of their health-related locus of control. This scale is the most researched and widely used locus of control scale

specific to health (Furnham & Steele, 1993). The measure has a total of 18 items and three scales. The scales include Internal Health Locus of Control (IHLC), Powerful Others Locus of Control (PHLC), and Chance Locus of Control (CHLC). Each scale consists of six items and is independent of the others. Each item is scored on a 6-point scale ranging from *strongly disagree* to *strongly agree*. Three total scores are derived, one for each scale. Acceptable internal consistency reliabilities have been reported in previous studies (α =.67 to .77). In addition, the scales were reported to be statistically independent, with high levels of concurrent and discriminant validity (Stanton, Raja, & Langley, 1995). In the current study, the internal consistency reliabilities for each scale also were in the acceptable range (α =.67 to .75).

Self-Efficacy. Participants completed the General Self-Efficacy subscale from the Self-Efficacy Scale (SE; Sherer et al., 1982) as a measure of general self-efficacy. This scale is the most widely used measure for assessing general self-efficacy. The General Self-Efficacy subscale consists of 17 items scored on a 14-point Likert-type scale, ranging from 1= *strongly disagree* to 14= *strongly agree*. Acceptable internal consistency reliabilities of .86 to .88 have been reported for the General Self-Efficacy subscale in previous studies (Endler, Kocovski, & Macrodimitris, 2001; Sherer & Adams, 1983). An acceptable internal consistency reliability also was found in the current study (α =.91).

Academic Self-Efficacy. The College Academic Self-Efficacy Scale was completed as a measure of academic self-efficacy (CASES; Owen & Froman, 1988). The scale consists of 33 self-report items that are scored on a 5-point Likert-type scale ranging from 1 = *very little* to 5 = *quite a lot*. The scale yields a total score that is derived from the mean of the items answered. Acceptable internal consistency reliabilities (α =.90 to .92) were reported by the authors of the

scale (Owen & Froman, 1988). Acceptable alpha reliabilities (α =.91 to .92) also were found in the current study.

Psychological Symptoms. The Brief Symptom Inventory (Derogatis, 1993) was completed as a measure of psychological symptoms. The inventory consists of 53 self-report items scored on a 5-point scale, ranging from 0 = *not at all* to 4 = *extremely*. The inventory consists of nine scales, of which three were used in the current study (i.e., Anxiety, Depression, and Somatization). Acceptable internal consistency reliabilities of .71 and higher have been reported for each scale in previous studies (Derogatis, 1993). Internal consistency reliabilities also were in the acceptable range in the current study (α =.82 to .89).

Physical Illness. Participants completed a modified version of the Pennebaker Inventory of Limbid Languidness (PILL; Pennebaker, 1982) to measure symptoms of physical illness. The original measure, consisting of 54 physical symptoms, was designed to assess the frequency of physical symptoms and complaints in the past year. In this study, the measure was used to assess the frequency of symptoms and complaints in the past week. Each item was scored on a Likert-type scale, with responses ranging from 1 = *not at all* to 4 = *6 or 7 days*. An acceptable internal consistency reliability (α =.89) was reported in a previous study that used a modified version similar to the one used in this study (MacGeorge, Samter, Feng, Gillihan, & Graves, 2004). An acceptable internal consistency reliability (α =.91) also was found in the current study.

Utilization of Health Services. Utilization of health services was examined by assessing participants' answers to questions on a demographics measure related to their utilization of health services. The questions asked participants to endorse whether they had a visit with a doctor within the week prior to the data collection or an appointment scheduled for the week following the time period when they participated in the study. Participants' answers were

calculated by adding the number of doctor visits scheduled within the two-week period assessed at each of the two data collections. Participants' responses were reported using percentages.

Demographics. Participants also completed a demographics measure. In addition to usual demographic information and recent utilization of health services, health status variables (e.g., current and past chronic and acute illnesses) and the nature of the illness(es) that led to those services being sought were assessed.

Procedure

Prior to data collection, the study was submitted for review and approved by the Internal Review Board at the University of Central Florida. The data for this study were collected at two time periods. The first period, intended as a real world low stress condition, was during the initial two weeks of the Spring semester at a large southeastern state university, and the second period, intended as a real world high stress condition, was during the last week of classes that same semester (i.e., one week prior to the final examination period).

Data collection took place in the participants' classroom following their regularly scheduled class time. The participants were given extra credit for each data collection period that they completed. Only participants from the initial data collection period were eligible to participate in the second data collection period. Participants completed consent forms prior to completing their initial data collection packets and were given debriefing forms following completion of their final packets. In accordance with ethical standards of psychological research, participants were informed of their right to withdraw their participation at any time without penalty. Completion time ranged from 30 minutes to 1 hour. A researcher was available during the data collection sessions to answer any questions that arose with regard to completing the measures.

CHAPTER THREE: RESULTS

Differences Between Participants Across Time Periods

Given the 25% attrition rate between the two data collection periods, Time 1 data were analyzed to assess for differences between those students who participated in both data collection periods (N=159) and those who only participated in the Time 1 data collection period. To complete these comparisons, chi-square analyses were conducted to compare responses to all categorical variables, whereas *t*-tests analyses were conducted to compare means for all continuous variables assessed.

With regard to demographic variables, chi-square analyses revealed that there was a significant difference for gender, indicating that males were less likely to participate in both data collection periods ($z = -2.40$, $p < .02$). In contrast, no significant differences were found for ethnicity or class standing ($z = -.04$, $p < .97$, and $z = -1.32$, $p < .19$, respectively). Furthermore, *t*-tests revealed no significant differences for age, GPA, or number of credit hours taken (t (df = 208) = 1.93, $p < .06$; t (df = 200) = -.45, $p < .66$; t (df= 208) = -1.12, $p < .27$) between the two groups.

With regard to the measures assessing levels of stress, *t*-tests revealed no significant differences between the two groups at Time 1 for the Perceived Stress Scale total score (t (df= 207) = -1.36, $p < .18$), the Academic Stress Scale total, or two of the Academic Stress Scale's three subscale scores (i.e., Physical and Psychosocial; t (df = 201) = 1.75, $p < .08$; t (df = 208) = .93, $p < .35$; t (df = 202) = 1.33, $p < .19$, respectively). In contrast, there was a significant difference between the two groups at Time 1 for the Psychological subscale score of the Academic Stress Scale (t (df = 206) = 2.47, $p < .01$), with the participants that did not return reporting lower levels of psychological stress resulting from academics initially.

With regard to the measures assessing locus of control, *t*-tests revealed no significant differences between the two groups for the three scales of the Internal, Powerful Others, and Chance Locus of Control Scale (t (df= 207) = 1.08, $p < .28$; t (df= 205) = .81, $p < .35$; t (df= 206) = -.75, $p < .46$, respectively) or for the three scales (i.e., Internal, Powerful Others, Chance) of the Multidimensional Health Locus of Control Scale (t (df= 208) = .86, $p < .39$; t (df= 209) = -1.37, $p < .17$; t (df= 206) = -1.23, $p< .22$, respectively).

With regard to the measures assessing self-efficacy, *t*-tests revealed no significant differences on the General Self-Efficacy subscale of the Self-Efficacy Scale (t (df = 209) = 1.46, $p < .15$) or on the College Academic Self-Efficacy Scale total score (t (df = 208) = -.36, $p < .72$) between the two groups at Time 1.

With regard to the measures assessing psychological symptoms and physical illness, *t*-tests revealed no differences between the two groups at Time 1 on the three scales (i.e., Anxiety, Depression, and Somatization) of the Brief Symptom Inventory (t (df = 208) = -1.28, $p < .20$; t (df = 206) = -1.11, $p < .27$; t (df = 205) = -.46, $p < .65$, respectively) or on the Pennebaker Inventory of Limbid Languidness total score (t (df = 195) = -1.65, $p < .10$).

Descriptive Information

Although none of the measures that were used in this study provided clinical cut off scores, comparing the means that were obtained on these measures to their respective possible range of scores provided a context for interpreting participants' scores. Means, standard deviations, and possible ranges for all measures are presented in Table 2. Overall stress levels, as measured by the Perceived Stress Scale and the three subscales of the Academic Stress Scale, were relatively low across both time periods. With regard to locus of control, a majority of the participants endorsed higher scores on the Internal Locus of Control scales relative to the

Powerful Others and Chance Locus of Control scales at both time periods. General and Academic Self-Efficacy also appeared to be relatively high. Psychological symptoms, as measured by the three subscales of the BSI, and physical symptoms, as measured by the PILL, were low across both time periods. Finally, the utilization of health services was relatively low across both time periods. With regard to the utilization of health services during the first data collection period, a small percentage reported that they either had a doctor's appointment within the last week (12.3%) or had one scheduled within the following week (8.5%). With regard to the utilization of health services during the second data collection period, a small percentage reported that they either had a doctor's appointment within the last week (7.1%) or had one scheduled within the following week (13.8%).

Relationships Among Measures From Time 1 to Time 2

Correlations were used to assess relationships for each measure across the two data collection periods, whereas t-tests were used to assess for any significant differences in these measures over time. With regard to participants' stress levels, the Perceived Stress Scale was correlated positively and significantly across data collection periods ($r = .59$, $p < .001$). In addition, *t*-tests revealed that the scores on the Perceived Stress Scale were significantly different across the data collection periods (t (df= 158) = -4.09, $p < .001$). Specifically, the scores on the Perceived Stress Scale were significantly lower for Time 1 ($M = 22.67$, $SD = 7.84$) than for Time 2 ($M = 24.59$, $SD = 8.20$), indicating higher overall stress levels for the second data collection time period.

The three subscales of the Academic Stress Scale also were correlated positively and significantly across the data collection periods (Physical, $r = .52$, $p < .001$; Psychological, $r = .51$, $p < .001$; and Psychosocial, $r = .53$, $p < .001$). Furthermore, *t*-tests revealed that each of

these subscales was significantly different across the data collection periods (t (df= 156) = 2.40, $p < .02$; t (df= 155) = 4.01, $p < .001$; and t (df= 148) = 4.18, $p < .001$, respectively). Specifically, the three subscales of the Academic Stress Scale (i.e., Physical, Psychological, and Psychosocial) were significantly higher for Time 1 (M = 21.12, SD = 5.71; M = 41.17, SD = 11.16; and M = 52.54, SD = 13.86, respectively) than for Time 2 (M = 20.18, SD = 6.38; M = 38.79, SD = 10.87; and M = 48.14, SD = 15.36, respectively), indicating lower academic stress levels for the second data collection period. This finding was contrary to the hypotheses for this study, which stated that academic stress levels would be lower during the first week of classes than they would be during the last week of the semester.

With regard to locus of control, all scores on all three scales (i.e, Internal, Powerful Others, Chance) of both the IPC (r = .62, $p < .001$, r = .69, $p < .001$, and r = .68, $p < .001$, respectively) and the MHLC (r = .62, $p < .001$, r = .64, $p < .001$, and r = .73, $p < .001$, respectively) were correlated positively and significantly across the data collection periods. In addition, t-tests revealed that only two scales, the IPC Powerful Others subscale and the MHLC Chance subscale, were significantly different across the data collection periods, (t (df= 153) = -1.90, $p < .003$, and t (df= 153) = -2.48, $p < .01$, respectively). Specifically, scores on both of these scales (i.e., the IPC Powerful Others and MHLC Chance) were significantly lower at the first data collection period (M = 21.14, SD = 6.17, and M = 16.33, SD = 4.84, respectively) than at the second data collection period (M = 22.22, SD = 5.94, and M = 16.76, SD = 4.67, respectively). This finding indicated that participants endorsed higher perceptions of the control of powerful others in general as well as in chance with regard to health-related locus of control at the second data collection period.

With regard to the measures used to assess self-efficacy, scores were correlated positively and significantly across the data collection periods on both the CASES (r = .65, p < .001) and the SE Scale (r = .83, p < .001). In addition, *t*-tests revealed that only the SE Scale was significantly different across the data collection periods (t (df= 156) = 4.08, p < .001). Specifically, the scores were higher during the initial data collection period than at the second data collection period (M = 178.75, SD = 33.57, versus M = 173.76, SD = 34.65), indicating higher ratings of general self-efficacy during the initial data collection period.

With regard to psychological and physical symptoms, all scores were correlated positively and significantly across the data collection periods on the Anxiety, Depression, and Somatization scales of the BSI (r = .63, p < .001, r = .61, p < .001, and r = .59, p < .001, respectively) and the PILL total score (r = .69, p < .001). In addition, *t*-tests revealed that only the PILL was significantly different across the data collection periods (t (df= 136) = 2.75, p < .007). Specifically, the scores were higher during the initial data collection period than at the second data collection period (M = 76.52, SD = 17.45, versus M = 72.21, SD = 15.77), indicating that participants rated their physical symptoms as being higher during the initial data collection period. This finding was contrary to the hypotheses for the study.

With regard to the utilization of health services, 20.8% of participants at the initial data collection period endorsed that they had utilized health services within the two week period assessed. Similarly, at the second data collection period, 20.9% of participants endorsed that they had utilized health services within the two week period assessed.

Relationships Among Stress, Illness, and the Utilization of Health Services

To examine many of the hypotheses proposed for this study, correlational analyses were examined. Correlations among all variables for Time 1 and Time 2 are presented in Table 3 and

Table 4, respectively. In testing hypothesis one, correlations were examined between the measures used to assess stress (i.e., the PSS and the three subscales of the Academic Stress Scale), the measures used to assess psychological and physical symptoms (i.e., the three scales of the BSI and the PILL), and the utilization of health services (i.e., the number of doctor visits and appointments scheduled currently and/or completed during the last week) for both data collection periods.

Time 1 Relationships. The PSS was correlated significantly and positively with the three scales of the BSI (Anxiety, $r = .54$, $p < .001$; Depression, $r = .62$, $p < .001$; and Somatization, $r = .40$, $p < .001$) and with the PILL ($r = .33$, $p < .001$) but not with the utilization of health services ($r = .02$, $p < .75$). The Physical Stressors subscale of the Academic Stress Scale also was correlated significantly and positively with the three scales of the BSI (Anxiety, $r = .23$, $p < .001$; Depression, $r = .15$, $p < .03$; and Somatization, $r = .14$, $p < .05$) and with the PILL ($r = .15$, $p < .04$) but not with the utilization of health services ($r = -.12$, $p < .09$). In contrast, the Psychological and Psychosocial subscales of the Academic Stress Scale were correlated significantly and positively with only the Anxiety ($r = .17$, $p < .02$, and $r = .27$, $p < .001$, respectively) and Depression ($r = .16$, $p < .02$, and $r = .25$, $p < .001$, respectively) scales of the BSI.

In summary, for the initial data collection period, general stress (PSS) and the physical dimension of academic stress (i.e., the Physical subscale of the Academic Stress Scale) were related significantly and positively to increased reports of psychological and physical symptoms but not to the utilization of health services. In contrast, psychological and psychosocial aspects of academic stress (i.e., the Psychological and Psychosocial subscales of the Academic Stress Scale) were related significantly and positively to increased reports of psychological symptoms

on the Depression and Anxiety scales of the BSI but not to psychological symptoms on the Somatization scale of the BSI, physical symptoms (i.e., the PILL), or to the utilization of health services.

Time 2 Relationships. For the Time 2 data, the PSS was correlated significantly and positively with the three scales of the BSI (Anxiety, $r = .54$, $p < .001$; Depression, $r = .57$, $p < .001$; and Somatization, $r = .41$, $p < .001$) and the PILL ($r = .37$, $p < .001$) but not with the utilization of health services ($r = .04$, $p < .60$). In contrast, the three subscales of the Academic Stress Scale were not correlated significantly with the PILL (Physical, $r = .11$, $p < .19$; Psychological, $r = .07$, $p < .37$; and Psychosocial, $r = .08$, $p < .37$). The Physical subscale of the Academic Stress Scale was correlated positively and significantly with the Anxiety, Depression, and Somatization scales of the BSI ($r = .25$, $p < .001$; $r = .27$, $p < .001$; and $r = .23$, $p < .004$, respectively), however. In addition, the Psychological subscale of the Academic Stress Scale was correlated positively and significantly with the Anxiety, Depression, and Somatization scales of the BSI ($r = .18$, $p < .03$; $r = .22$, $p < .006$; and $r = .18$, $p < .03$, respectively). Further, the Psychosocial subscale of the Academic Stress Scale was correlated positively and significantly with the Anxiety, Depression, and Somatization scales of the BSI ($r = .23$, $p < .005$; $r = .25$, $p < .002$; and $r = .23$, $p < .004$, respectively). Finally, none of the Academic Stress Scale subscales (i.e., the Physical, Psychological, and Psychosocial subscales) were correlated with the utilization of health services ($r = -.12$, $p < .09$; $r = -.06$, $p < .37$; and $r = -.08$, $p < .24$, respectively).

In summary, for the second data collection period, general stress (PSS) was related significantly and positively to increased reports of psychological and physical symptoms but not to the utilization of health services. In contrast, the different aspects of academic stress (i.e.,

Physical, Psychological, and Psychosocial subscales) were only related to increased reports of psychological symptoms but not to physical symptoms or to the utilization of health services.

Relationships Between Locus of Control, Self-Efficacy, Stress, Illness, and the Utilization of Health Services

In testing hypothesis two, correlations were examined among the measures used to assess locus of control (i.e., the IPC and the MHLC), the measures to assess self-efficacy (i.e., the CASES and the SE scale), the measures used to assess stress (i.e., the PSS and the three subscales of the Academic Stress Scale), the measures used to assess psychological and physical symptoms (i.e., the three dimensions of the BSI and the PILL), and the utilization of health services for both data collection periods. Correlations among all variables for Time 1 and Time 2 are presented in Table 3 and Table 4, respectively.

Time 1 Relationships. With regard to the relationship between locus of control and stress, the external locus of control scales (i.e., the Powerful Others and Chance scales) from the IPC and the Chance scale from the MHLC were related significantly and positively to the PSS (r = .41, $p < .001$; r = .47, $p < .001$; and r = .20, $p < .004$, respectively) and to the Physical (r = .25, $p < .001$; r = .27, $p < .001$; and r = .27, $p < .001$, respectively), Psychological (r = .26, $p < .001$; r = .26, $p < .001$; and r = .26, $p < .001$, respectively), and Psychosocial (r = .34, $p < .001$; r = .34, $p < .001$; and r = .31, $p < .001$, respectively) subscales of the Academic Stress Scale. In contrast, the Internal scales from both the IPC and the MHLC were related significantly and negatively to the PSS (r = -.34, $p < .001$, and r = -.22, $p < .001$, respectively) and to the Physical (r = -.31, $p < .001$, and r = -.14, $p < .04$, respectively), Psychological (r = -.28, $p < .001$, and r = -.21, $p < .003$, respectively), and Psychosocial (r = -.32, $p < .001$, and r = -.23, $p < .001$, respectively) subscales of the Academic Stress Scale. In summary, these findings indicated that there was a positive

relationship between external locus of control and stress and a negative relationship between internal locus of control and stress in partial support of hypothesis two.

With regard to the relationship between self-efficacy and stress, the SE scale and the CASES score both were related significantly and negatively to the PSS (r = -.53, p < .001, and r = -.37, p < .001, respectively) and to all three subscales of the Academic Stress Scale (Physical, r =-.17, p < .01, and r = -.19, p < .005, respectively; Psychological, r = -.21, p < .002, and r = -.27, p < .001, respectively; Psychosocial, r = -.29, p < .001, and r = -.35, p < .001, respectively). In summary, these findings indicated that there was a negative relationship between self-efficacy and stress in partial support of hypothesis two.

With regard to the relationship between locus of control and psychological symptoms, the BSI Anxiety, Depression, and Somatization scales were related significantly and positively to the IPC Powerful Others (r = .31, p < .001; r = .36, p < .001; and r = .29, p < .001, respectively) and Chance (r = .36, p < .001; r = .40, p < .001; and r = .26, p < .001, respectively) scales as well as to the MHLC Powerful Others scale (r = .17, p < .02; r = .14, p < .04; and r = .16, p < .02, respectively). The BSI Anxiety and Depression subscales also were related significantly and positively to the MHLC Chance subscale (r = .20, p < .004, and r = .27, p < .001, respectively). With regard to the relationship between locus of control and physical symptoms, both of the IPC general external locus of control scales (i.e., Powerful Others, r = .19, p < .01, and Chance, r = .17, p < .02) were related significantly and positively to the PILL, suggesting that there was a positive relationship between a general external locus of control and physical symptoms. In contrast, none of the health-related locus of control scales (i.e., Internal, Powerful Others, and Chance scales) were related significantly to the PILL (r = -.14, p < .11; r = .10, p < .16; and r = .11, p < .14, respectively). In summary, these findings indicated that there was a positive

relationship between external locus of control and increased psychological and physical symptoms in partial support of hypothesis two.

With regard to the relationship between self-efficacy and psychological symptoms, the SE scale and the CASES score both were related significantly and negatively to the Anxiety (r = -.38, p < .001, and r = -.19, p < .005, respectively), Depression (r = -.53, p < .001, and r = -.37, p < .001, respectively), and Somatization (r = -.33, p < .001, and r = -.23, p < .001, respectively) scales of the BSI. With regard to the relationship between self-efficacy and physical symptoms, the SE scale was related significantly and negatively to the PILL (r = -.22, p < .002). These results indicated that there were negative relationships between self-efficacy and psychological and physical symptoms as well as between academic self-efficacy and psychological symptoms.

With regard to locus of control and the utilization of health services, the Internal Locus of Control scales from both the IPC and the MHLC (r = -.05, p < .47, and r = -.06, p < .40, respectively), the Powerful Others scales from both the IPC and the MHLC (r = -.03, p < .70, and r = .10, p < .16, respectively), and the Chance scales from both the IPC and the MHLC (r = .02, p < .78, and r = .06, p < .43, respectively) were not related significantly to the utilization of health services. With regard to self-efficacy and the utilization of health services, general self-efficacy (SE, r = .02, p < .78) and academic self-efficacy (CASES, r = .05, p < .45) were not related significantly to the utilization of health services. These results indicated that there was no relationship between locus of control and the utilization of health services or between self-efficacy and the utilization of health services.

Time 2 Relationships. With regard to the relationship between locus of control and stress, the external locus of control subscales (i.e., Powerful Others and Chance) from both the IPC and the MHLC were related significantly and positively to the PSS (r = .32, p < .001; r = .48, p <

.001; $r = .24$, $p < .002$; and $r = .39$, $p < .001$, respectively), and to the Physical ($r = .22$, $p < .005$; $r = .34$, $p < .001$; $r = .23$, $p < .003$; and $r = .38$, $p < .001$, respectively), Psychological ($r = .18$, $p < .02$; $r = .22$, $p < .005$; $r = .21$, $p < .008$; and $r = .29$, $p < .001$, respectively), and Psychosocial ($r = .17$, $p < .04$; $r = .25$, $p < .002$; $r = .20$, $p < .02$; and $r = .35$, $p < .001$, respectively) subscales of the Academic Stress Scale. In contrast, the Internal scales from both the IPC and the MHLC were related significantly and negatively to the PSS ($r = -.26$, $p < .001$, and $r = -.20$, $p < .01$, respectively). In summary, these findings indicated that there was a positive relationship between external locus of control and general and academic stress as well as a negative relationship between internal locus of control and general stress in partial support of hypothesis two.

With regard to the relationship between self-efficacy and stress, the SE scale and the CASES score both were related significantly and negatively to the PSS ($r = -.42$, $p < .001$, and $r = -.23$, $p < .007$, respectively) and to all three subscales of the Academic Stress Scale (Physical, $r = -.29$, $p < .001$, and $r = -.18$, $p < .02$, respectively; Psychological, $r = -.22$, $p < .006$, and $r = -.19$, $p < .02$, respectively; Psychosocial, $r = -.26$, $p < .001$, and $r = -.20$, $p < .02$, respectively). In summary, these findings indicated that there was a negative relationship between self-efficacy and stress in partial support of hypothesis two.

With regard to the relationship between locus of control and psychological symptoms, all three BSI scales (i.e., Anxiety, Depression, and Somatization) were related significantly and positively to the External Locus of Control scales of the IPC (Powerful Others, $r = .37$, $p < .006$; $r = .46$, $p < .001$; and $r = .38$, $p < .001$, respectively; Chance, $r = .42$, $p < .001$; $r = .44$, $p < .001$; and $r = .33$, $p < .001$, respectively) and the MHLC (Powerful Others, $r = .24$, $p < .003$; $r = .28$, $p < .001$; and $r = .22$, $p < .005$, respectively; Chance, $r = .40$, $p < .001$; $r = .39$, $p < .001$; and $r =$

.35, $p < .001$, respectively). In addition, the Anxiety ($r = -.17$, $p < .03$) and Depression ($r = -.28$, $p < .001$) scales of the BSI were related negatively to the Internal Locus of Control scale from the IPC. With regard to the relationship between locus of control and physical symptoms, the PILL was related significantly and positively to the External Locus of Control scales of the IPC (Powerful Others, $r = .23$, $p < .006$; Chance, $r = .25$, $p < .002$) and the MHLC (Powerful Others, $r = .17$, $p < .04$; Chance, $r = .21$, $p < .01$). In summary, these findings indicated that there was a positive relationship between external locus of control and increased psychological and physical symptoms in partial support of hypothesis two.

With regard to the relationship between self-efficacy and psychological symptoms, the SE scale and the CASES score both were related significantly and negatively to all three scales of the BSI (Anxiety, $r = -.42$, $p < .001$, and $r = -.18$, $p < .03$, respectively; Depression, $r = -.45$, $p < .001$, and $r = -.25$, $p < .002$, respectively; and Somatization, $r = -.39$, $p < .001$, and $r = -.17$, $p < .04$, respectively). With regard to the relationship between self-efficacy and physical symptoms, the SE scale was related significantly and negatively to the PILL ($r = -.20$, $p < .02$). These results indicated that there was a negative relationship between self-efficacy and psychological and physical symptoms as well as between academic self-efficacy and psychological symptoms, lending further support for hypothesis two.

With regard to locus of control and the utilization of health services, neither the Internal Locus of Control scales from the IPC and the MHLC ($r = -.002$, $p < .98$, and $r = -.05$, $p < .56$, respectively), the Powerful Others scales from the IPC and the MHLC ($r = -.04$, $p < .60$, and $r = .09$, $p < .26$, respectively), nor the Chance scales from the IPC and the MHLC ($r = -.07$, $p < .40$, and $r = -.08$, $p < .33$, respectively) were related significantly to the utilization of health services. With regard to self-efficacy and the utilization of health services, neither general self-efficacy

(SE, $r = .14$, $p < .09$) nor academic self-efficacy (CASES, $r = .03$, $p < .72$) were related significantly to the utilization of health services. These results indicated that there were no relationships between locus of control or self-efficacy and the utilization of health services.

Structural Equation Modeling

Model Analyses. Structural equation modeling (SEM) analyses were conducted with Statistica SEPATH. The general least squares to maximum likelihood (GLS-ML) method of covariance structural analysis was used. In examining the overall fit of the models, the squared error of approximation (RMSEA), the comparative fit index (CFI), and the parsimonious fit index (PFI) were used. Satisfactory model fit was indicated by RMSEA values less than or equal to .10 (Kline, 1998) and CFI values greater than or equal to .90 (Bentler, 1992). Further, adequate parsimony is indicated by PFI values greater than or equal to .60 (James, Mulaik, & Brett, 1982). Chi-square tests were not used to assess overall model fit due to their sensitivity to sample size (James et al., 1982).

Similar to other research, a two-step modeling approach was used (Anderson & Gerbing, 1988). In the initial step, a measurement model that allows all latent constructs to correlate freely was developed and evaluated. In the final step, structural analysis to test relationships among latent variables was conducted. This procedure allowed structural relationships to be tested only after ensuring that latent variables were measured adequately. Initially, to create a suitable measurement model, exploratory procedures were used. Then, to test relationships among latent variables, confirmatory procedures were used. This process decreased the possibility that relationships among latent variables would be misinterpreted due to poor construct measurement (Anderson & Gerbing, 1988).

Latent Constructs and Indicators (Time 1). In testing hypothesis three, structural equation modeling was used to create a causal model with individuals' stress, symptoms, and utilization of health services. See Figure 1 for this model. The latent constructs included stress, symptoms, and the utilization of health services. Stress was indicated by the total score from the PSS and the three subscales of the Academic Stress Scale (i.e., Physical, Psychological, and Psychosocial Stressors). The three scales from the BSI (i.e., Anxiety, Depression, and Somatization) and the total score from the PILL were used to indicate symptoms. Finally, the utilization of health services was measured directly. Thus, stress and symptoms had four indicators each. Including the utilization of health services variable, the total number of indicators in the initial model was nine.

Measurement Model (Time 1). The initial measurement model failed to fit the data adequately (i.e., RMSEA > .10; CFI < .90), suggesting the need for respecification. The need for respecification is a common occurrence when conducting SEM analyses (Anderson & Gerbing, 1988). In particular, standardized residuals revealed that the PSS was not a significant indicator of stress. Thus, this indicator was deleted from future analyses, resulting in the stress variable being comprised solely of academic stress. The respecified measurement model for Time 1 data, shown in Figure 2, did not reproduce adequately the covariance matrix as indicated by the RMSEA (>.10) value. As a result, hypothesis three was not supported. The RMSEA, CFI, and PFI values for the structural model are shown in Table 7, and the structural model and path coefficients for the Time 1 data are shown in Figure 5.

Latent Constructs and Indicators (Time 2). In testing hypothesis four, structural equation modeling was used to create a causal model estimating the mediating effects of locus of control and self-efficacy in the relationships among individuals' stress, symptoms, and utilization of

health services. See Figure 3 for this model. The latent constructs in the current study included stress, locus of control, self-efficacy, symptoms, and the utilization of health services, with the later two being the proposed outcomes. Stress was indicated by the total score from the PSS and the three subscales of the Academic Stress Scale (i.e., Physical, Psychological, and Psychosocial Stressors). Locus of control was indicated by the three scales of the Internal, Powerful Others, and Chance Locus of Control Scales, along with the three scales of the MHLC. The total scores from the SE scale and the CASES were used to indicate self-efficacy. The three scales from the BSI (i.e., Anxiety, Depression, and Somatization scales) and the total score from the PILL were used to indicate symptoms. Finally, the utilization of health services was measured directly. Thus, stress had four indicators, locus of control had six indicators, self-efficacy had two indicators, and symptoms had four indicators. Including the utilization of health services variable, the total number of indicators in the initial model was seventeen.

Measurement Model (Time 2). The initial measurement model failed to fit the data adequately, suggesting the need for respecification. Standardized residuals revealed that several indicators were not related clearly to their respective latent constructs (e.g., the total score from the PSS was not a significant indicator of stress). Thus, these indicators were deleted from future analyses. Following the removal of these indicators, the stress variable in the model included only academic stress, and the locus of control variable included only external locus of control. The respecified measurement model for Time 2 data, shown in Figure 4, reproduced adequately the covariance matrix, as indicated by the RMSEA (.07), CFI (.97), and PFI (.67) values. In addition, all factor loadings exceeded .60 (all $ps < .0005$), indicating convergent validity. Intercorrelations of the latent constructs and model statistics for original and respecified

measurement models are shown in Tables 5 and 6. In summary, the second model did fit adequately the Time 2 data.

Structural Model (Time 2). Given the appropriate measurement model for Time 2 data, the hypothesized structural model was tested. The structural model reproduced adequately the covariance matrix as indicated by the RMSEA (.10), CFI (.92), and PFI (.77) values shown in Table 7. Figure 6 shows the structural model and path coefficients for the Time 2 data.

In addressing hypothesis four, further structural equation analyses were conducted with the Time 2 data to assess for the mediation of the relationship between stress and illness by locus of control and self-efficacy. The fitted structural model was tested for mediation by setting the hypothesized direct path to zero (i.e., stress to illness), leaving the mediational paths available in the model. If such a mediational model fits the data with the restricted path coefficient, a chi-square test is done to ensure that the new model is a better fit for the data. The models with the restricted path coefficients did not reproduce the data adequately, however. Thus, full mediation was not found, and hypothesis four was not supported completely. At best, given the path coefficients and this lack of fit, locus of control may serve as a partial mediator in the relationship between stress and illness.

CHAPTER FOUR: DISCUSSION

The biological phenomena that mediate the relationship between stress and illness are well established (Segerstrom & Miller, 2004). In contrast, fewer studies have examined potential psychological phenomena that may serve as mediators in this relationship. Thus far, research has suggested that individuals' beliefs about the extent to which they can control outcomes of importance to them and their self-efficacy play an important role in determining stress levels (Abouserie, 1994; Gadzella, 1994; Shelley & Pakenham, 2004; Wiedenfeld et al., 1990). Given that such relationships exist, further research is needed to examine variables such as locus of control and self-efficacy as mediators in the relationship between stress and illness. Furthermore, given the constant rise in health care costs, it is important to assess the utilization of health care services in the context of the relationships among stress, illness, and potential mediators of the stress-illness link. Thus, the purpose of the current study was to assess the mediating effects of locus of control and self-efficacy in the relationships among stress, illness, and the utilization of health services. In addition, this study is unique in that it capitalized on a real world test of stress (i.e., final examinations) in a college student population.

Regarding the relationships among stress, increased reports of psychological and physical symptoms, and the utilization of health services (i.e., hypothesis one), general stress was correlated positively and significantly with increased reports of physical and psychological symptoms but was not related to the utilization of health services for both the Time 1 and Time 2 data collection periods. Furthermore, academic stress (for both Time 1 and Time 2) was correlated positively and significantly with increased reports of psychological symptoms but not with increased reports of physical symptoms or the utilization of health services. There was one exception, however; the physical dimension of academic stress during Time 1 was correlated

positively and significantly with increased reports of physical symptoms. On this subscale of the Academic Stress Scale, college students were asked to rate the amount of stress that they were experiencing with regard to examinations, term papers, and announced quizzes.

Given these findings, it may be that, during the first two weeks of classes, a time when college students are typically informed about class expectations (e.g., usually through a review of the syllabus), college students may be overwhelmed by the number of examinations, papers, and quizzes that they will be expected to complete during the current semester. Being overwhelmed by these expectations may lead to an increase in physical symptoms related to these projected stressors. In contrast, during the last week of the semester, just prior to final examinations, college students have already completed most of the work associated with the course, and they typically have an idea of the examination format. Thus, although they are still experiencing general stress related to their upcoming final examinations and the completion of the semester, the physical dimension of academic stress, which includes stress related to term papers and quizzes, is lower and has less of an impact on their functioning. In summary, the hypothesis regarding the relationship between stress, increased reports of psychological and physical symptoms, and the utilization of health services was only supported partially.

Hypothesis two suggested that external locus of control and negative self-efficacy would be related positively to increased stress, increased psychological and physical symptoms (i.e., illness), and the increased utilization of health services. Results indicated that external locus of control was correlated positively and significantly with stress, whereas self-efficacy was correlated negatively and significantly with stress for both the Time 1 and Time 2 data collection periods. Similarly, for both data collection periods, external locus of control was correlated positively and significantly with physical and psychological symptoms. In contrast, general self-

efficacy was correlated negatively and significantly with physical and psychological symptoms, and academic self-efficacy was correlated negatively and significantly with psychological symptoms. Finally, external locus of control and self-efficacy were not correlated significantly to the utilization of health services at either data collection period.

These findings regarding locus of control and self-efficacy support the established link between stress and external locus of control and provide additional information regarding the negative relationship between self-efficacy and stress. In addition, these findings establish a link between external locus of control and psychological and physical symptoms as well as between negative self-efficacy and psychological and physical symptoms. Thus, it is important to monitor the relationships that constructs such as locus of control and self-efficacy have with individuals' physical and emotional well-being. If individuals were aware of their locus of control and self-efficacy in the context of their psychological and physical symptoms, they may be able to increase their awareness about ways to keep themselves 'healthy'.

Overall, utilization of health services was low in this sample. Although the restriction of range that resulted from the low endorsements of this variable may have resulted in a lack of significant relationships, such low endorsements also may be an indication of college students' reluctance to seek health services (e.g., due to fear or an inability to afford such services) or of not valuing the importance of seeking health services. In particular, college students are at an age where they are experiencing a multitude of life changes (e.g., moving out on their own, losing touch with childhood friends, acquiring new responsibilities) and, at the same time, are striving to succeed in academics (e.g., Arnett, 2000). These factors may preclude them from focusing on their own emotional and physical well-being. It also may be that the act of seeking services is actually seen as a stressor itself and, as a result, is avoided. In addition, a majority of

the participants endorsed high levels of internal locus of control and self-efficacy, which may have prevented them from seeking these services. In summary, the hypothesis regarding the relationship between external locus of control, self-efficacy, stress, illness, and the utilization of health services was supported only partially.

With regard to the third hypothesis, which suggested that there would be a direct relationship between stress and illness and between illness and the utilization of health services, the path coefficients for the first model examined suggested that there was a direct relationship between stress and illness and between illness and the utilization of health services for the Time 1 data collection period. The first model examined did not adequately fit the data for Time 1, however. Thus, hypothesis three was not supported by the data. It may be that the decreased levels of general stress along with the unexpected increased levels of academic stress at Time 1 changed the hypothesized relationships in unexpected ways. In particular, it may be that general stress is very different from academic stress, with each being related to psychological and physical symptoms in unique ways. Furthermore, the data suggested that the two measures of stress (i.e., general stress and academic stress) used together in the current study did not adequately capture "stress", the construct intended. It will be important for future studies to find other ways to examine stress in order to gain a better understanding of this complex construct and how it is related to individuals' functioning.

Finally, hypothesis four, suggesting that locus of control and self-efficacy would act as mediators in the relationship between stress and illness, was not supported completely by the data. Although the path coefficients for the second model were consistent with a mediation effect for locus of control in the relationship between stress and symptoms, the data did not fit the model tested when the direct path between stress and illness was set to zero. Thus, locus of

control may be acting only as a partial mediator in the relationship between stress and illness. In other words, although the paths between stress and locus of control and between locus of control and illness were significant, the direct path between stress and illness was still important to the fit of the model. In contrast, neither the path coefficients nor the model fit suggested that self-efficacy was a mediator in the relationship between stress and illness. Certainly, it must be considered that the locus of control and self-efficacy variables may have been restricted somewhat in range. Specifically, college students in this sample endorsed relatively high levels of internal locus of control and self-efficacy but relatively low levels of external locus of control. Nonetheless, these constructs deserve further study as potential mediators in the relationship between stress and illness using more diverse samples from the general population who are experiencing different types of stressful experiences.

Overall, the findings of this study coincide with the notion that individual reactions to situations deemed stressful are not universal. Instead, individuals' reactions are mediated, at least in part, by psychological variables, such as locus of control. Future studies should continue to explore other potential mediators in the relationship between stress and illness (e.g., social support) so that such relationships are understood fully. Once a complete understanding has been achieved with regard to potential psychological mediators in this relationship, appropriate interventions can be designed to help decrease the impact of stress on individuals' psychological and physical functioning. More specifically, interventions can be designed to target these mediators as one potential avenue of decreasing individuals' experience of psychological and physical symptoms and, subsequently, the use of health care services. In addition, the utilization of health services variable may need to be expanded in future studies to include alternative, "self-help" treatments that individuals may seek to improve their health status. Such alternative

treatments may include taking herbal supplements, increasing healthy eating habits, and participating in some form of exercise. Finally, future investigations should assess these relationships in non-college student populations. It may be that the stress, locus of control, and self-efficacy of individuals attending college are very different from those experienced by those not attending college (e.g., individuals raising families and/or working full-time jobs).

The findings of this study must be viewed within the context of its limitations. First, a limitation to the current study was the 25% attrition rate. Although few significant differences were found between participants who participated at both Time 1 and Time 2 and those who participated at only Time 1, the participants lost between the two data collection periods may have been significantly different with regard to the variables assessed during the second data collection period. These individuals may have dropped out of the course in which the data was collected for various reasons, including poor grades on assignments or tests, or they may have been absent during the second data collection period due to illness. Thus, it cannot be determined whether the results from Time 2 would be generalizable to those individuals who did not participate at the second data collection period.

Second, another limitation involved the data collection periods chosen. Given the higher levels of academic stress at Time 1 and the higher levels of general stress at Time 2, the data collection periods may not have been ideal representations of "low stress" versus "high stress" conditions. The higher levels of academic stress experienced at Time 1 may have been the result of several factors, including the overwhelming amount of information provided about the expectations of a course (e.g., term papers, exams) at the beginning of the semester, financial stressors related to paying for tuition and books, and/or adjusting to new living arrangements (e.g., new apartment, new roommates). In contrast, the higher levels of general stress at the end

of the semester may have been related to various factors not related directly to academics (e.g., concerns about finding a job for the summer, going home following the completion of the semester). Third, participants' limited usage of health services during the data collection periods resulted in a restricted range of this variable, which could have affected the findings of this study significantly. Finally, the lack of diversity among the participants (i.e., participants were college students enrolled in psychology courses and were predominantly Caucasian females) may decrease the generalizability of the findings.

In summary, higher stress levels were associated with higher levels of physical and psychological symptoms, an external locus of control, and lower self-efficacy. In contrast, lower levels of stress were associated with higher levels of internal locus of control. Given the link established between stress and illness and the individual differences associated with reactions to stressful situations, it is important for future examinations to continue to identify potential mediators of the stress-illness link. With such information, interventions can be developed to indirectly reduce the utilization of health care services. In particular, it is important to identify the ways in which individuals' needs for health care services can be reduced by promoting better psychological and physical health for all individuals. By identifying variables that mediate the relationship between stress and illness, interventions (e.g., cognitive therapy) can be tailored to target specific cognitive processes that are inherent aspects of these mediating psychological variables, thereby alleviating the negative effects of stress on individuals' psychological and physical functioning.

APPENDIX A: FIGURES

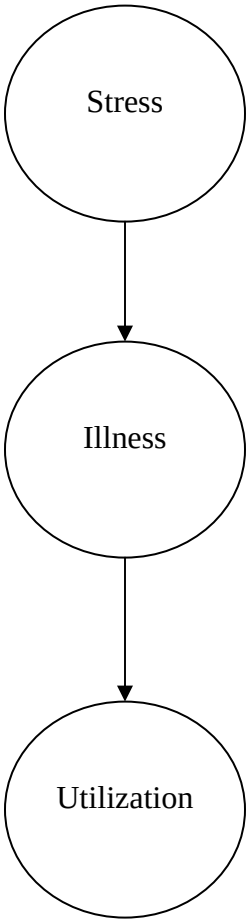

Figure 1: Hypothesized Relationship Among Variables for Time 1 Data

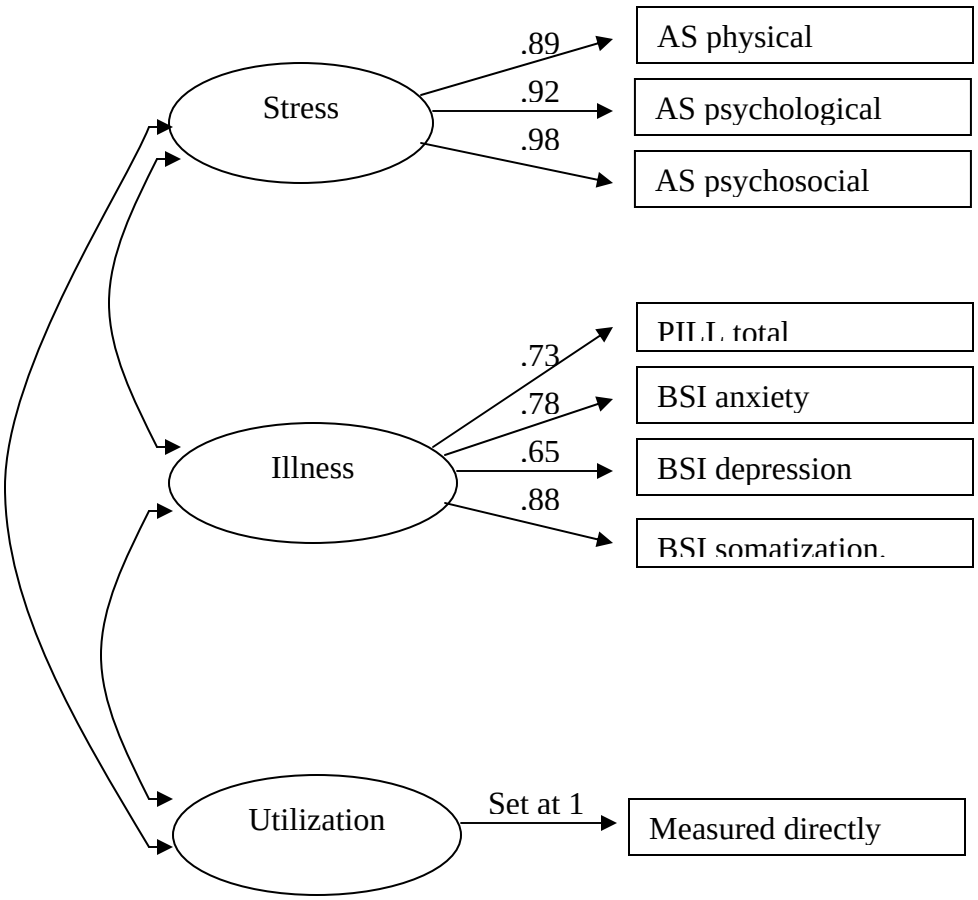

Figure 2: Time 1 Measurement Model

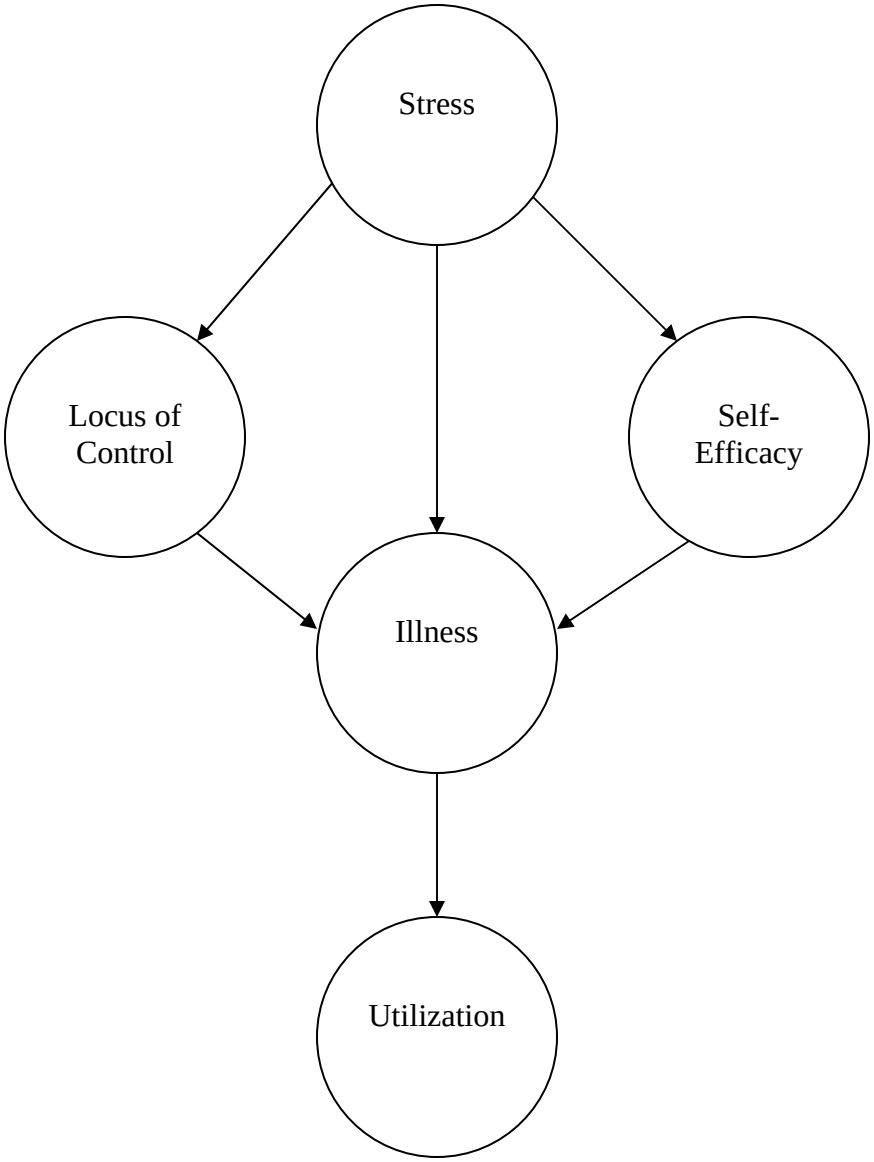

Figure 3: Hypothesized Relationship Among Variables for Time 2 Data

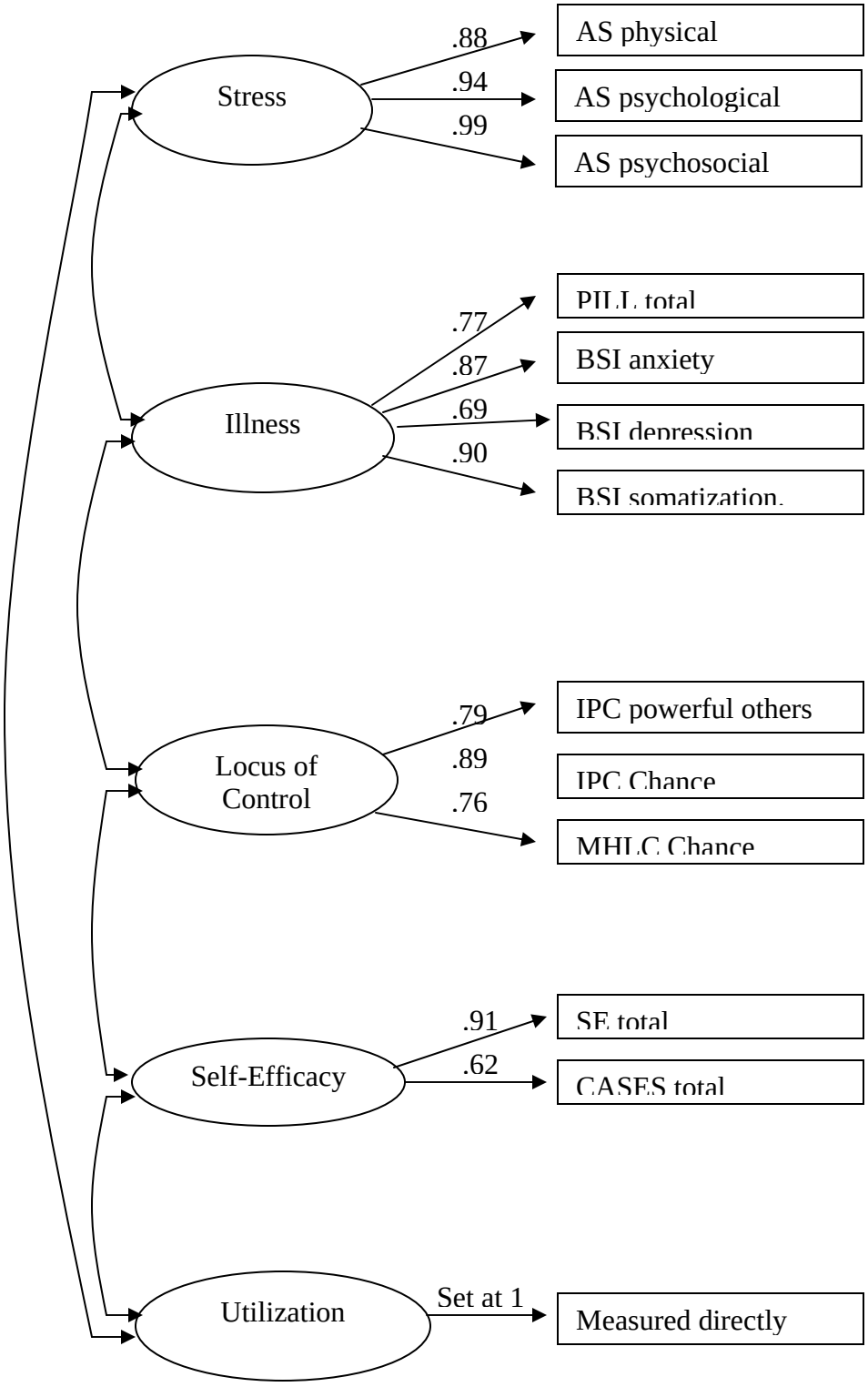

Figure 4: Time 2 Measurement Model

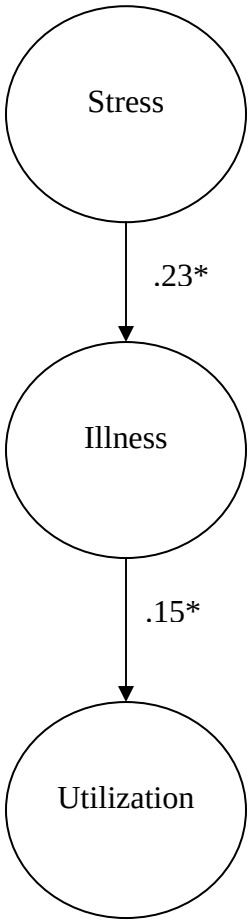

Figure 5: Time 1 Fitted Covariance Structure Model

Note. * indicates significant standardized parameter estimates for which $p < .05$.

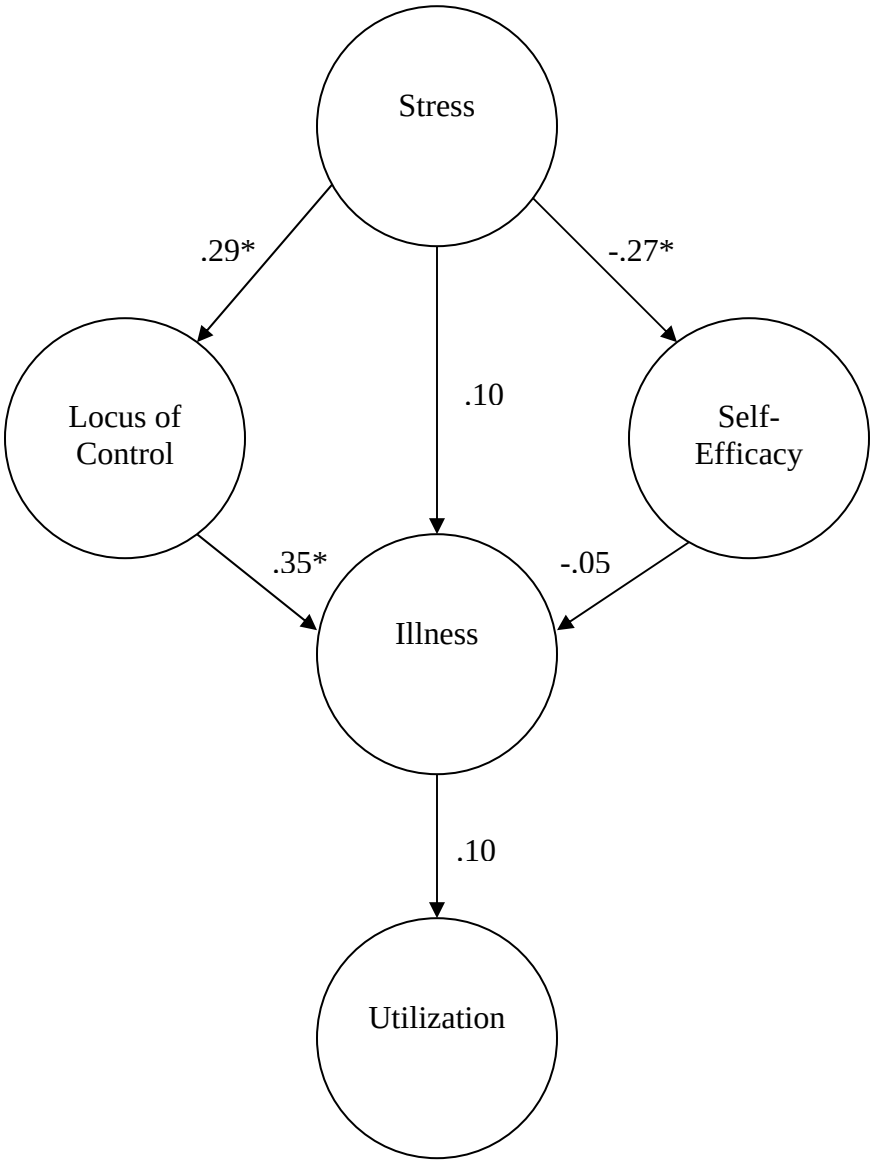

Figure 6: Time 2 Fitted Covariance Structure Model

Note. * indicates significant standardized parameter estimates for which $p < .05$.

APPENDIX B: TABLES

Table 1. Demographics

	Time 1	Time 2
N	211	159
Age	*M*=24.11; *SD*=6.75	*M*=24.8; *SD*= 7.06
Gender		
Female	73.0%	77.0%
Male	27.0%	23.0%
Ethnicity		
Caucasian	69.7%	68.0%
Hispanic American	13.7%	10.6%
African American	9.5%	12.6%
Other	7.1%	8.8%
Class standing		
Freshman	7.6%	6.9%
Sophomore	10.9%	8.2%
Junior	52.1%	51.6%
Senior	27.5%	32.1%
Classified as full-time students	79.5%	74.1%
GPA 3.0 of higher	73.0%	78.8%
One or more exams scheduled within following week	27.0%	74.3%
Diagnosed with chronic illness	16.6%	15.1%
Had sought mental health services in the past	37.9%	37.2%

Table 2. Means, Standard Deviation, and Ranges for All Measures

	Time 1		Time 2		Possible Range
	Mean	SD	Mean	SD	
PSS	22.67	7.84	24.59	8.20	0-56
ASS					
Physical	21.12	5.17	20.18	6.38	8-40
Psychological	41.17	11.16	38.79	10.87	14-70
Psychosocial	52.54	13.86	48.14	15.36	19-95
PILL	76.52	17.45	72.21	15.77	54-270
BSI					
Anxiety	.67	.71	.67	.76	0-4
Depression	.69	.79	.68	.82	0-4
Somatization	.56	.65	.53	.72	0-4
IPC					
Internal	34.84	4.52	35.05	4.86	8-48
Pow. Others	21.14	6.17	22.22	5.94	8-48
Chance	21.90	6.05	22.46	6.43	8-48
MHLC					
Internal	25.41	4.30	25.75	4.13	6-36
Pow. Others	16.01	4.59	16.09	4.65	6-36
Chance	16.33	4.84	16.76	4.67	6-36
SE	178.75	33.57	173.76	34.65	17-238
CASES	3.77	.53	3.81	.54	1-5
Utilization of Health Services	20.8% of participants		20.9% of participants		0-100%

Table 3. Time One Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. PSS	-																
2. ASS (physical)	.23**	-															
3. ASS (psych)	.28**	.83**	-														
4. ASS (psychsoc)	.35**	.87**	.90**	-													
5. PILL	.33**	.15*	.02	.08	-												
6. BSI (anx)	.54**	.23**	.17*	.27**	.52**	-											
7. BSI (depr)	.62**	.15*	.16*	.25**	.36**	.66**	-										
8. BSI (somat)	.40**	.14*	.08	.13	.70**	.66**	.54**	-									
9. IPC (intern)	-.37**	-.31**	-.28**	-.32**	.13	-.29*	-.37**	-.25**	-								
10. IPC (p.o.)	.41**	.25**	.26**	.34**	.19*	.31**	.36**	.29**	-.31**	-							
11. IPC (chance)	.47**	.27**	.26**	.34**	.17*	.36**	.40**	.26**	-.29**	.69**	-						
12. MHLC (intern)	-.22**	-.14*	-.21**	-.23**	-.11	-.07	-.23**	-.09	.36**	-.19**	-.25**	-					
13. MHLC (p.o.)	.13	.11	.13	.10	.10	.17*	.14*	.16*	-.02	.37**	.30**	-.20**	-				
14. MHLC (chance)	.20**	.27**	.26**	.31**	.11	.20**	.27**	.13	-.28**	.44**	.55**	-.35**	.45**	-			
15. SE	-.53**	-.17*	-.21**	-.29**	-.22**	-.38**	-.53**	-.33**	.53**	-.52**	-.49**	.29**	-.17*	-.37**	-		
16. CASES	-.37**	-.19**	-.27	-.35**	-.14	-.19**	-.37**	-.23**	.32**	-.34**	-.25**	.20**	-.08	-.28**	.60**	-	
17. Utilization	.02	-.12	-.06	-.08	.15*	.05	.04	.11	-.05	-.03	.02	-.06	.10	.06	.02	.05	-

Table 4. Time Two Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. PSS	-																
2. ASS (physical)	.36**	-															
3. ASS (psych)	.33**	.84**	-														
4. ASS (psychsoc)	.34**	.90**	.94**	-													
5. PILL	.37**	.11	.07	.08	-												
6. BSI (anx)	.54**	.25**	.18*	.23**	.61**	-											
7. BSI (depr)	.57**	.27**	.22*	.25**	.48**	.75**	-										
8. BSI (somat)	.41**	.23**	.18*	.23**	.70**	.80**	.67**	-									
9. IPC (intern)	-.26**	-.05	-.02	-.03	-.09	-.17*	-.28**	-.13	-								
10. IPC (p.o.)	.32**	.22**	.18*	.17*	.23**	.37*	.46**	.38**	-.28**	-							
11. IPC (chance)	.48**	.34**	.22**	.25**	.25**	.42**	.44**	.33**	-.29**	.71**	-						
12. MHLC (intern)	-.20**	.01	-.09	-.04	-.05	-.05	-.09	-.07	.34**	-.20*	-.05	-					
13. MHLC (p.o.)	.24	.23**	.21**	.20*	.17*	.24**	.28**	.22**	-.01	.38**	.28**	-.18*	-				
14. MHLC (chance)	.40**	.38**	.29**	.35**	.21*	.40**	.39**	.35**	-.21**	.65**	.66**	-.29**	.40**	-			
15. SE	-.42**	-.29**	-.22**	-.26**	-.20*	-.42**	-.45**	-.39**	.43**	-.60**	-.56**	.18*	-.24**	-.51**	-		
16. CASES	-.21**	-.18*	-.19*	-.20*	-.05	-.18*	-.25**	-.17*	.29**	-.40**	-.38**	.18*	-.30**	-.34**	.53**	-	
17. Utilization	.04	<.01	-.02	.01	.17*	.09	-.01	.25**	<.01	-.04	-.07	-.05	.09	-.08	.14	.03	-

Table 5. Correlations Among Latent Constructs for Time 1 Data

	Stress	Illness	Utilization
Stress	1	-	-
Illness	.20*	1	-
Utilization	-.10	.18*	1

Note. $N = 211$. *$p < .05$

Table 6. Correlations Among Latent Constructs for Time 2 Data

	Stress	Illness	Locus of Control	Self-Efficacy	Utilization
Stress	1	-	-	-	-
Illness	.21*	1	-	-	-
Locus of Control	.29*	-.41*	1	-	-
Self-Efficacy	-.27*	-.31*	-.77*	1	-
Utilization	-.02	.11	-.12	.16	1

Note. $N = 150$. *$p < .05$

Table 7. Fit Indices for Covariance Structure Analysis

Fit Indices for Covariance Structure Analyses

Test	*Chi Squared*	*df*	RMSEA	CFI	PFI
		Measurement models			
1. Respecified model					
Time 1 data	93.17	18	.15	.93	.59
Time 2 data	95.05	56	.07	.97	.67
		Structural models			
2. Hypothesized model					
Time 1 data	99.41	25	.13	.93	.81
Time 2 data	182.19	69	.10	.92	.77

Note. N = 211 for Time 1; N = 159 for Time 2

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