MODELING THE RELATIONSHIP BETWEEN SEXUAL VICTIMIZATION AND PHYSICAL HEALTH

by

SEOKA SALSTROM

(Under the Direction of Joan L. Jackson)

ABSTRACT

Recent investigations have documented that sexual victimization is related to long-term physical health. Using Structural Equation Modeling (SEM), this study examined pathways by which this relationship exists. Data collected from 737 college women (110 sexually victimized women and 627 nonvictimized women) were analyzed. The model included psychological and behavioral processes that have each been linked to both sexual victimization and health outcome (i.e., perceived stress, depression, locus of control, maladaptive coping, sleep quality, alcohol use, and sexual risk taking). The role of family of origin conflict was also investigated. Tests of overall model fit suggest that the implied model fit the data reasonably well. The total indirect path between sexual victimization and health outcome was significant. There was also a significant indirect effect for sexual victimization on depression through perceived stress, maladaptive coping, and external locus of control. Perceived stress appeared to be largely responsible for this effect. A significant indirect effect was also found for depression on physical health outcome through increased alcohol use, sexual risk taking, and poor sleep quality. Specifically, alcohol use and poor sleep quality were primarily responsible for this mediated effect. Family conflict and sexual victimization were significantly correlated. The present study generally supports pathways proposed within Schnurr and Green’s (2004) theoretical model. It also highlights the usefulness of an integrated model of care. Implications of the present findings include the importance of considering mental health conditions, such as depression, when
evaluating physical health problems even among young trauma survivors. Early mental health intervention could help prevent chronic psychological conditions from developing, thereby lessening the impact on physical health as well as health care cost and utilization.

INDEX WORDS: Sexual Victimization, Physical Health, Stress, Coping, Depression, Health Behaviors
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CHAPTER 1

INTRODUCTION

It is estimated that 20 to 30% of women have been sexually victimized as children (Briere, 1992), and a survey of college women indicates that approximately 54% have experienced some form of sexual victimization (Koss, Gidycz, & Wisniewski, 1987). Long-term psychological sequelae of child sexual abuse (CSA) among female survivors have been well researched. High levels of depression and elevated trauma symptoms (Briere, 1992) are two frequently documented psychological outcomes. Other sequelae include increased poor health behaviors (Springs & Friedrich, 1992), higher probability of adult victimization (Beitchman et al., 1992), and sexual dysfunction (Hazzard, Rogers, & Angert, 1993).

However, research has also documented an association between sexual victimization and its long-term physical health effects. Previous research suggests that a history of sexual victimization predicts negative health outcomes such as increased physical symptoms and conditions. Attempting to explain this relationship, researchers are now exploring pathways through which past sexual victimization could be related to current physical functioning. This study examined several psychological and behavioral pathways suggested by previous studies.

Specifically, this study used structural equation modeling (SEM) to examine the roles of perceived stress, depression, locus of control, maladaptive coping, sleep quality, and health behaviors (alcohol use and sexual risk taking) in the relationship between sexual victimization severity and health. The role of family conflict, which has been linked to both sexual victimization and physical health, was also investigated. Although PTSD has been established as a likely mediator between sexual victimization and health (see Schnurr & Green, 2004 for a
review), it will not be examined in this study, as a large proportion of the sample identified themselves as nonvictims and thus, were not asked to complete the PTSD symptom scale, which assessed symptoms only as they related to the sexual victimization experience.

Sexual Victimization and Physical Health

The relationship between sexual victimization and poor physical health has been well established. It has been noted in many retrospective studies and in two prospective studies. It has been found in several community and medical samples, as well as two college samples. Furthermore, the relationship is consistently seen in examinations of global health as well as specific medical conditions.

Sexual victimization and global health. Numerous retrospective studies have indicated that individuals with a history of sexual victimization report poorer global health, as evidenced by more severe physical symptomatology, poorer health behaviors, poorer perceptions of health, and higher medical utilization as compared to those without a victimization history. Using a population-based sample, Golding (1994) found that women with sexual victimization histories reported more chronic illness, greater functional impairment, poorer health perceptions, and more medically explained and unexplained physical symptoms than nonvictimized women. Furthermore, poorer subjective health and functional impairment were also noted when both sexually assaulted men and women from pooled multiple population studies were simultaneously evaluated (Golding, 1996a; Golding, Cooper, & George, 1997).

Comparable results have been documented in several community samples where sexual victimization was related to present illness symptoms (Newman et al., 2000; Waigandt, Wallace, Phelps, & Miller, 1990; Walker et al., 1999), negative health behaviors, negative current perceived health (Waigandt et al., 1990; Walker et al., 1999), increased number of doctor
visits/medical services (Alexander et al., 1998; Newman et al. 2000), greater use of medications
for pain (Alexander et al., 1998), and greater functional impairment (Alexander et al., 1998;
Walker et al., 1999). Moreover, researchers examining a nationally representative sample of
women found that a history of sexual victimization was related to increased reports of poor
general health, sustained physical injury in adulthood, and miscarriage (Thompson, Arias, Basile,
& Desai, 2002).

Researchers have also examined the relationship between sexual victimization and health
among women of specific cultural backgrounds. For example, a study conducted in Sweden
found that women who have been exposed to domestic violence, sexual abuse, or both, had lower
self-reported health and higher sickness absence from work than those never exposed (Hensing
& Alexanderson, 2000). Similarly, Lown and Vega (2001) found that Mexican American
women reporting previous-year physical or sexual intimate partner violence were more likely to
report poor overall physical health as well as the presence of several chronic medical conditions
and somatic symptoms.

Other populations in which this relationship has been recognized are those who
experienced sexual assault while in the military and women in the prison system. One study
found that lifetime number of sexual assaults was predictive of overall measures of physical
health symptoms for men and women in the U.S. army (Martin, Rosen, Durand, Knudson, &
Stretch, 2000) and another found parallel results in a sample of women VA users (Frayne et al.,
1999). Mullings (1998) reported that, in a sample of women being admitted to prison, prior
victimization strongly predicted negative health outcome, even after controlling for drug and
alcohol abuse.
Within a criminal victimization community sample, where the occurrence of rape was included in the cases labeled as most severe, it was found that severely victimized women (as compared to nonvictims) reported poorer perceived health, more physical complaints, less physical well-being, more injurious health behaviors, twice as many doctor visits in the last year, and outpatient costs that were 2.5 times greater (Koss, Koss, & Woodruff, 1991). Furthermore, even after accounting for the contributions of demographics and other stressful life events, criminal victimization remained a significant predictor of health perceptions (Koss, Woodruff, & Koss, 1990).

Two prospective, longitudinal studies have examined the relationship between sexual victimization and health in community women. One study compared women who had experienced sexual assault to a matched comparison group (Kimerling & Calhoun, 1994). Both groups were repeatedly assessed on several dimensions of negative health impact during the year following the assault. The researchers found that sexual assault victims reported significantly more somatic complaints, poorer physical health perceptions, and increased medical utilization. However, at one-year follow-up, group differences on somatic complaints and perceived health became nonsignificant, whereas differences in medical utilization widened. This suggests that features outside of physical health could play a role in increased medical utilization. Similarly, a second prospective study found that sexually abused women engaged in more healthcare utilization and also reported more gastrointestinal and gynecological symptoms than a comparison group (Sickel, Noll, Moore, Putnam, & Trickett, 2002).

Within medical settings, it has been found that sexually victimized women report significantly more hospitalizations, more physical troubles, and poorer overall health perception (Moeller, Bachman, & Moeller, 1993) as well as more pain complaints, functional disability,
lifetime surgeries, somatic symptoms (Leserman et al., 1996), and higher use of medical care (Felitti, 1991; Hulme, 2000) than nonabused women. Furthermore, evidence suggests that sexual victimization is related to greater levels of somatization and health risk behaviors in a medical sample (Springs & Friedrich, 1992). Another study has similarly found that both physically and sexually abused women presenting at a pain clinic reported higher rates of physical symptoms and increased pain as compared to nonabused subjects, however, differences in health care utilization were not found (Green, Flowe-Valencia, Rosenblum, & Tait, 1999). Other examinations of medical use in a clinical sample of women have found that sexual abuse victims labeled as distressed (based on the SCL-90 Global Severity Index) as well as nonvictims labeled as distressed had significantly more outpatient visits than did non-distressed victims or control participants, suggesting that distress is related to higher utilization, regardless of victimization status (Arnow et al., 1999).

There are few examinations of sexual victimization and health within college samples. One study relating sexual abuse history to health outcome utilizing a college sample of men and women found that sexual abuse history was correlated with poorer perceived health, pain complaints in more locations and of greater severity, and greater health care utilization (Fillingim, Wilkinson, & Powell, 1999). Another study of college women found similar results, such that sexual assault history was significantly related to physical symptoms (Clum, Calhoun, & Kimerling, 2000). However, a third study using a university sample found that a history of sexual victimization was unrelated to physical health symptoms after controlling for child physical maltreatment, thus suggesting that the relationship between sexual victimization and health within this population is equivocal at this time (Runtz, 2002). In summary, the relationship between sexual victimization and several negative health outcomes appears to be
present across study samples (e.g., population-based, community, clinical) and designs (i.e., retrospective and prospective).

Sexual victimization and specific medical conditions. Not only is overall health outcome related to sexual victimization history, but the presence of specific medical conditions has also been well established. An association exists between sexual abuse history and both gastrointestinal illness (see Drossman, Talley, Leserman, Olden, & Barreiro, 1995 for a review) and gynecological conditions (Golding, 1996b; Golding & Taylor, 1996; Golding, Wilsnack, & Learman, 1998). The link between musculoskeletal pain and abuse history has also been tested. Researchers have identified such a link for fibromyalgia (Alexander et al., 1998; Boisset-Pioro, Esdaile, & Fitzcharles, 1995; Hudson & Pope, 1995; Taylor, Trotter, & Csuka, 1995; Walker et al., 1997), back pain (Fillingim, Wilkinson, et al., 1999; Frayne et al., 1999; Linton, 1997) chronic pain (Wurtele, Kaplan, & Keairnes, 1990), headaches (Cunningham, Pearce, & Pearce, 1988; Domino & Haber, 1987; Fillingim, Wilkinson, et al., 1999; Frayne et al., 1999; Golding, 1999; Leserman, Drossman, & Hu, 1998), chronic pelvic pain (Cunningham et al., 1988; Drossman et al., 1990; Reiter, Shakerin, Gambone, & Milburn, 1991), and general musculoskeletal pain (Fillingim, Wilkinson, et al., 1999; Lechner, Vogel, Garcia-Shelton, Leichter, & Stiebel, 1993; Linton, Larden, & Gillow, 1996).

Other evidence suggests a link between abuse and respiratory and pulmonary conditions (Frayne et al., 1999; Lechner et al., 1993; Leserman et al., 1998), neurological conditions (Lechner et al., 1993), dental problems (Hays & Stanley, 1996), asthma, and heart palpitations (Cunningham et al., 1988). Finally, a history of sexual assault has been related to thyroid disease in older men and to breast cancer and arthritis in older women (Stein & Barrett-Conner, 2000). Whereas certain previously mentioned health outcomes may result from sexual victimization
through various mediating and moderating variables, conditions such as pelvic inflammatory disease, STD’s, and some gynecological symptoms may represent a direct link due to trauma-related injuries (Koss et al, 1991; Koss & Heslet, 1992).

**Dose-response effect.** There is much evidence supporting the dose-response relationship between sexual assault and health. Several studies have found that more severe abuse is related to more severe negative health effects, such as more physical symptomatology, higher medical utilization, more health risk behaviors, poorer overall health perceptions, functional limitations, and a higher prevalence of many conditions (Arnow et al., 1999; Felitti et al., 1998; Golding, 1996a; Golding, 1996b; Golding, et al., 1997; Koss et al., 1990; Leserman et al., 1996; Leserman et al., 1998; Springs & Friedrich, 1992; Stein & Barrett-Conner, 2000; Ullman & Siegel, 1995; Walker et al., 1992; Walker, Gelfand, Gelfand, Koss, & Katon, 1995; Walker et al., 1999). Thus, a measure of abuse severity was used in this study.

**Sexual Victimization and Perceived Stress**

Perceived stress (degree to which situations in one’s life are appraised as stressful) has been linked to both victimization and health problems. Findings suggest that CSA victims with PTSD experience symptoms consistent with Acute Stress Disorder in response to everyday stressors, perceiving these stressors as highly threatening (Koopman, Gore-Felton, Classen, Kim, & Spiegel, 2001). Further, Thakkar and McCanne (2000) found that, compared to nonvictimized women, sexually victimized women may be especially vulnerable to the effects of daily stressors (see below). Increased reactivity to everyday stressors has negative implications for one’s health (Friedman & McEwen, 2004).
*Perceived Stress and Health*

*Perceived stress and physical illness.* A number of reviews have documented the link between stress and the onset, course, severity, and prognosis of physical illness (Andersen, Kiecolt-Glaser, & Glaser, 1994; Cohen & Williamson, 1991; Girard, Arthur, & Reuler, 1985; Steptoe, 1991). Much research in this area has been correlational; however, a few studies have examined the link between stress and infection experimentally (Cohen, Doyle, & Skoner, 1999; Cohen, Tyrell, & Smith, 1991; Glaser et al., 1992). Glaser et al. (1992) tested the effects of three hepatitis B inoculations on the immune response of 48 medical students during exams. Those students who seroconverted (developed antibodies in blood serum) after the first injection were significantly less anxious and stressed than those who did not. Similarly, Cohen and colleagues (1991) found that, following injection of one of five respiratory viruses, healthy subjects reporting more initial stress had higher rates of respiratory infection and clinical colds. Furthermore, the rates of infection increased in a dose-response manner, such that higher levels of stress were related to more severe infection. In a more recent study, Cohen et al. (1999) infected 55 adults with influenza A virus after assessing each on level of psychological stress. The authors found once again that greater initial stress levels predicted greater expression of the illness.

*Perceived stress and physical symptoms.* Much of the research on the impact of stress on health focuses on the effects of daily hassles. Several studies have documented a relationship between daily hassles stress and somatic health problems (Delongis, Folkman, & Lazarus, 1988; Wu & Lam, 1993). Among college students, one study found that daily stressors significantly predicted somatic symptoms after controlling for demographics, illness, and social support (Zaleski, Levey-Thors, & Schiaffino, 1998). Thakkar and McCanne (2000) examined this
relationship among sexually victimized and nonvictimized college women on a day-to-day basis. They found that heightened stress was associated with increased reports of physical symptoms among abused women but not non-abused women. Given that a history of sexual victimization seems to increase one’s reactivity to daily stressors and that higher perceptions of stress are related to the onset of physical illness as well as symptom reports, perceived stress is included in the proposed model.

Sexual Victimization and Family Conflict

Family functioning during childhood has been associated with adult outcome in sexually victimized women (Briere, 1992; Yama, Tovey, Fogas, & Teegarden, 1992). It has been suggested that a negative family environment creates a critical vulnerability to later psychopathology (Yama et al., 1992). Specifically, research suggests that, along with high cohesion and expressiveness, high familial conflict during childhood predicts long-term psychological distress in this population (Fassler, Amodeo, Griffin, Clay & Ellis; 2005). Several studies have found that, compared to nonvictimized women, victimized women report higher levels of family conflict (e.g., Edwards & Alexander, 1992, Meyerson, Long, Miranda, & Marx, 2002). Similarly, Wind and Silvern (1994) found that perceptions of parental warmth and support each partially mediated the relationship between childhood abuse and both adult depression and self-esteem. However, this result was not replicated in a study that used SEM to model the relationship between abuse severity, parental support, coping, and adjustment, although a significant correlation between abuse severity and lack of parental support was noted (Merrill, Thomsen, Sinclair, Gold, & Milner, 2001).
Family Conflict and Health

Much research supports the association between family environment and physical health. In their review, Repetti, Taylor, and Seeman (2002) reported that there is a dose-response relationship between amount of family dysfunction in childhood and the occurrence of several adult diseases. Specifically, they outline numerous studies highlighting the relationship between perceived family conflict (e.g., mother-child conflict, fighting in family of origin, open expression of anger and aggression) and poor physical health (e.g., risk of coronary artery disease, physical symptoms, physician diagnoses). They further review research suggesting the mediational role of alterations in HPA and sympathetic-adrenomedullary (SAM) reactivity, emotional processing, and increased health risk behaviors. Other studies examining the relationship between perceived parental support and adult health outcome report similar findings. For example, one study using latent growth curve modeling found changes in parental support were related to changes in adolescent physical health status (Wickrama, Lorenz, & Conger, 1997). Given that sexually victimized women report higher levels of family conflict than nonvictimized women and higher levels of family conflict are related to physical illness and symptom reports, family conflict is included in the proposed model as an exogenous variable.

Sexual Victimization and Depression

As the following review will highlight, depression has been consistently linked to both a history of sexual victimization and to negative physical health. Numerous studies have found significantly higher levels of depression in sexually traumatized women (Briere & Runtz, 1989; Carlin & Ward, 1992; Goldberg, 1994; Miller, Monson, & Norton, 1995). Furthermore, a meta-analytic review of 22 studies comparing sexually victimized college women to controls found a significant effect size for depressive symptomatology (Rind, Tromovitch, & Bauserman, 1998).
Therefore, examinations of the effects of depression on health outcome, having implications for medical utilization/ costs, psychological treatment, and quality of life, are a valuable expansion of the sexual victimization literature.

**Depression and Health**

*Depression and mortality.* A number of longitudinal studies have provided evidence linking depression and increased mortality risk. It is well established that major depression is related to increased mortality (Penninx et al., 2001; Zheng et al., 1997). However, it appears that even low levels of depressive symptoms significantly increase mortality risk. A study examining the association between sub-clinical depressive symptoms and mortality in a large population of older women found that risk for all-cause mortality increased by 47% for those with six or more symptoms, and a dose-response pattern was noted. The association remained strong even after controlling for chronic illness and poor health behaviors (Whooley & Browner, 1998). Another study found similar results regarding minor depression in men; however, mortality risk for women was only present for those with major depression. Poor health behaviors explained only a small portion of mortality risk (Penninx et al., 1999). Other evidence suggests that depressive symptoms at one month poststroke predicted mortality at 12 and 24 months; however, in this study, Major Depression was not a significant predictor of mortality (House, Knapp, Bamford, & Vail, 2001). Despite these inconsistencies, it nonetheless appears that depressive symptomatology is related to mortality.

*Depression and physical illness.* Similar to the research outlining the effects of stress on illness, numerous studies have documented the link between depression and the onset, course, severity, and prognosis of physical illness (for reviews see Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; O’Leary, 1990). Moreover, depression is associated with high medical costs
(Greenberg, Stiglin, Finkelstein, & Berndt, 1993) as well as decreased physical functioning even after adjusting for sociodemographic factors and chronic medical conditions (Wells, Golding, & Burnam, 1988).

Research examining this relationship within medically compromised groups suggests that depression is associated with increased negative outcome for patients with cardiovascular disease (Dalack & Roose, 1990), a history of myocardial infarction (Welin, Lappas, & Wilhelmsen, 2000), hypertension and no history of cardiovascular disease (Cohen, Madhavan, & Alderman, 2001), and coronary artery disease (Carney et al., 1988). It has also been found that depression significantly contributed to functional impairment in individuals with chronic obstructive pulmonary disease (Kim et al., 2000). Depression was not found to be a risk factor for cancer death during a 15-year longitudinal examination (Zonderman, Costa, & McCrae, 1989). However, in patients with malignant melanoma, psychiatric interventions that decrease affective distress seem to have favorable effects on survival (Fawzy et al., 1993).

The association between depression and illness has also been observed in healthy young adults even after controlling for demographic and health risk variables (Vandervoort, 1995). Moreover, similar to the reviewed link between depression and mortality, those with sub-clinical depression are at risk for physical illness as well. Mild depressive symptoms have been found to negatively affect physical illness and functioning, immune functioning, and disease course in four longitudinal studies. Aneshensel, Frerichs, and Huba (1984) reported that, among a large sample of community adults, elevated depressive symptomatology was related to higher levels of physical illness over a four-month period. The relationship, although significant for both men and women, was found to be more pronounced in women such that women experienced longer-lasting suppression of the immune response, thus a longer recovery period.
Further evidence suggests that mild depressive symptoms impact physical disability in a dose-response manner such that the likelihood of becoming disabled increases and the likelihood of recovery from disability decreases with each increase in depressive symptoms (Cronin-Stubbs et al., 2000). Another recent examination reported that older adults with chronic, mild depressive symptoms had poorer lymphocyte proliferation to two mitogens than nondepressed controls (McGuire, Kiecolt-Glaser, & Glaser, 2002). Furthermore, in a study on poststroke mood disorders, a poorer prognosis was found for those with dysthymia than for those with major depression at 2-year follow-up, suggesting that chronic, mild symptoms may be more damaging to health than one major depressive episode (Robinson, Bolduc, & Price, 1987).

Several hypotheses exist regarding the mechanisms that account for the association between depression, illness, and death. It has been suggested that depressed individuals have a stronger attentional focus on bodily sensations (Stegen, Van Deist, Van de Woestijne, & Van de Bergh, 2001), and may amplify normal physiological sensations and report sensations as physical symptoms (for reviews, see Lipowski, 1990; Lomabardi, 1990; Pennebaker, 1982; Watson & Pennebaker, 1989). Others have suggested that depression increases an individual’s likelihood of engaging in poor health behaviors, thereby increasing chances for physical illness (Green & Pope, 2000; Mayne, 1999).

Given the above relationships, it could be hypothesized that depression acts as a mediator between sexual victimization and health. Golding et al. (1997) examined depression as a possible mediator between sexual assault and poor subjective health. She found that the relationship between sexual assault and poor subjective health did not markedly change when controlling for depression, thus the mediational hypothesis was not supported. However, it has also been observed that the associations between sexual victimization and pain complaints, and
between sexual victimization and health care utilization became nonsignificant when depression and somatization were controlled (Fillingim, Wilkinson, et al., 1999). These results are consistent with the finding that sexual victimization became a nonsignificant predictor of self-reported health symptoms when depression was added to the regression equation (Clum et al., 2000; Zoellner, Goodwin, & Foa, 2000). Moreover, depression has also been found to partially mediate between sexual victimization and health outcome among college women (Salstrom, 2004). Thus, results of at least four studies support the hypothesis that depression mediates between sexual victimization and health.

Sexual Victimization and Locus of Control

Locus of control is defined as the belief that one’s behavior is under one’s personal control (internal view), or that they are determined by forces outside of oneself (external view). Many studies have found that sexually abused women have a more external locus of control than non-abused women (Moyer, DiPietro, Berkowitz, & Stunkard, 1997; Rhodes, Ebert, & Meyers, 1993; Waller, 1998). However, other studies have not found significant differences between abused and non-abused women on locus of control (Porter & Long, 1999; Regehr, Regehr, & Bradford, 1998). These contradictory findings may be due to differences in the samples used. For example, Moran and Eckenrode (1992) noted that a younger age of abuse onset was associated with a more external view; therefore, it is possible that those studies which found abused women to have a higher external locus of control may have had samples with an earlier abuse onset. Other studies on sexually abused women and control have found that an internal locus of control is protective against negative long-term effects such as low self-esteem, poor overall mental health (Banyard, 1999) and depression (Moran & Eckenrode, 1992). Furthermore,
an internal locus of control was reported to be one of many resilience factors among a well functioning sample of victims (Valentine & Feinauer, 1993).

*Locus of Control and Health*

The relationship between locus of control and physical health has been widely studied, although most of this research has focused on the buffering effects of an internal locus of control. Rodin, Timko, and Harris (1985) reported that those with an internal locus of control endorsed better perceived health, fewer physical symptoms, and quicker recovery from sickness than those with an external view. Further, a study of twin pairs found that genetic variation in physical health decreases with increased perception of control (Johnson & Krueger, 2005). Low internal locus of control predicted somatic complaints in a community sample even when controlling for family cohesion and life change events (Terre, Poston, Foreyt, Jeor, & Horrigan, 2004). In contrast, Hahn (2000) found that those with an internal LOC reported more anger and health symptoms (but less depression) than those with an external LOC. One study documented that an external locus of control resulted in poor health among caregivers of family members and controls (McNaughton, Patterson, Smith, & Grant, 1995).

Health-related locus of control (HLOC) is an aspect of perceived control that is especially important to evaluate when examining physical health outcome. Among college students, external HLOC was related to recent and chronic physical symptoms as well as major health problems even when controlling for a variety health risk behaviors (Vandervoort, Luis, & Hamilton, 1997). Another study found that those with 0 or 1 physical condition had a more internal HLOC than those with multiple conditions (van der Linden, van den Akker, & Buntinx, 2001). Within a sample of victimized and nonvictimized women living with AIDS, Simoni and Ng (2002) found that an external HLOC independently predicted perceived health but did not
mediate the relationship between trauma and perceived health. Given that sexual victimization is related to a more external locus of control, which is related to poor health outcome, it is included in the proposed model.

**Sexual Victimization and Maladaptive Coping**

Research suggests that the experience and severity of sexual victimization may affect the type of coping strategies utilized immediately after the incident as well as long term and that these strategies affect psychological and physical health outcome. Specifically, increased experiential avoidance and the use of avoidant coping has been implicated in poor outcome within traumatized groups. For example, Tull and Jacupcak (2003) found that a history of physical and/or sexual assault was associated with experiential avoidance as well as fear of depression and anxiety. Moreover, experiential avoidance was predictive of psychological functioning beyond the effects of PTSD among traumatized veterans (Lerner, Rhatigan, Plumb, & Shipherd, 2003).

Bal, Van Oost, Bourdeaudhuij, and Crombez (2003) found that sexually abused adolescents were more likely to use avoidant coping strategies than non-abused adolescents and that avoidant coping mediated between sexual abuse and fear, depression, dissociation, anger, sexual problems, and emotional stability. Similarly, Merrill and colleagues (2001) used SEM to show that increased CSA severity predicted increased avoidant and self-destructive coping and that the effects of CSA severity on later psychological symptoms were mediated by these coping strategies.

Other forms of coping have also been implicated in the relationship between trauma and adjustment. Confrontive coping (aggressive or hostile efforts to alter the situation) has been
found to mediate between sexual abuse characteristics and psychological distress in adulthood (Steel, Sanna, Hammond, Whipple, & Cross, 2004).

Using hierarchical linear modeling, another study found that increases in religious coping were associated with positive life changes over time among sexually victimized women (Frazier, Tashiro, Berman, Steger, & Long, 2004).

Maladaptive Coping and Health

In their chapter on coping and health in trauma populations, Aldwin and Yancura (2004) summarize findings suggesting that avoidant coping has a negative impact on physical health. Specifically, some laboratory studies have found that avoidant and repressive coping are associated with higher cortisol levels, diastolic blood pressure, and cardiovascular reactivity, which are related to immune disturbances. They reviewed further studies showing a direct relationship between avoidant coping and cholesterol fractions associated with cardiovascular disease as well as studies showing that this type of coping may disturb immune functioning (i.e., elevate monocyte counts, overstimulate allergic responses). In contrast, a meta-analysis on coping and health outcome in general populations did not find a relationship between avoidant or confrontive coping and physical health although a consistent relationship was found between these coping strategies and psychological dysfunction (Penley, Tomaka, & Wiebe, 2002).

Research examining the link between religious coping and health has generally supported the positive effects of this type of coping. A two-year longitudinal study among medically ill elderly found that positive forms of religious coping were associated with improvements in health over time and that negative forms of religious coping were related to declines in health status (Pargament, Koenig, Tarakeshwar, & Hahn, 2004). Similar results were observed for bereaved adults (Pearce et al., 2002). Among low-income, minority college-bound adolescents,
inconsistent findings were noted such that religious coping was related to positive physical health only among Mexican-Americans, only positive psychological health among Asian-Americans, and among African-Americans, coping methods were not related to psychological or physical health (Vaughn & Roesch, 2003). In sum, sexual victimization is related to maladaptive coping, which is related to poor health outcome, especially immune suppression; it is therefore included in the proposed model.

*Sexual Victimization and Sleep Quality*

Sleep disturbance is common among traumatized individuals, as it is a symptom common to both PTSD and depression. Krakow and colleagues, (2001) reported that extremely poor sleep quality was associated with PTSD severity among sexually assaulted community women. However, these authors suggest that sleep disturbance among sexually victimized women may be more complex than simply another symptom of depression and PTSD. They identified many women with sleep-disordered breathing and sleep movement disorders and purport that their sleep disturbances cannot be fully accounted for by the hyperarousal/PTSD mechanism. They further suggest that undiagnosed sleep disorders may increase psychological symptoms and that sleep quality measures may add valuable information to our understanding of sleep disturbances in this population. In a follow up study, Krakow and colleagues (2002) noted that sexually victimized women with PTSD and sleep disordered breathing (SDB) reported significantly worse nightmares, sleep quality, anxiety, depression, PTSD symptoms, and quality of life than victimized women with PTSD but without SDB. Abuse severity may also play a role in sleep disturbance as suggested by the finding that African-American women who experienced force during CSA incidents reported higher levels of sleep disturbance (Banyard, Williams, Siegel, & West, 2002).
Sleep Quality and Health

Research suggests that sleep disturbance is related to physical health problems. Sleep disturbance has been linked to cardiovascular health and functional disability among elderly adults (Newman, Enright, Manolio, & Haponik, 1997) as well as immune functioning in those exposed to Hurricane Andrew (Ironson et al., 1997) and HIV-positive men and women (Cruess et al., 2003). Another study showed that sleep quality and quantity mediated the relationship between socioeconomic status and physical health (Moore, Adler, Williams, & Jackson, 2002). EEG-assessed sleep disturbance also mediated between intrusion/avoidance symptoms and immune function among bereavement-related depressed individuals (Hall et al., 1998). Finally, Clum, Nishith, and Resick (2001) found that sleep disturbance accounted for significant variance in physical symptoms beyond that of PTSD and depressive symptoms in rape victims. Given the findings that sexual victimization is associated with decreased sleep quality, which is related to poor health outcome, it is included in the proposed model.

Sexual Victimization and Health Risk Behaviors

Sexual Victimization and alcohol. Health risk behaviors observed among sexually victimized women include excessive smoking, substance abuse, risky sexual behaviors, and less frequent preventative health service use (Springs & Friedrich, 1992). The relationship between sexual victimization and alcohol abuse has been replicated in a large-scale study within a community-based primary care setting (McCaughr, Kern, Kolodner, Dill, & Schroeder, 1997) and among adult female twins (Kendler et al., 2000). The latter study found that the twin exposed to CSA was more likely to develop alcohol problems and was at increased risk for illness; they also noted a dose response relationship. Miller, Downs, and Testa (1993) replicated the association when controlling for treatment condition, family background, and demographic
variables. Finally, in order to address the question of directionality, researchers conducted a two-year longitudinal analysis of assault and subsequent substance use and found that lifetime and recent assault was related to alcohol abuse two years later even when controlling for earlier substance use and assault history (Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997). Possible mechanisms that may account for this relationship were reviewed by Rheingold, Acierno, and Resnick (2004). For example, alcohol increases endorphin activity, which may counteract hypothesized post-trauma endorphin reduction and allow avoidance of emotional pain. Further, alcohol use may obstruct cognitive intrusions and guilt feelings.

**Sexual Victimization and sexual risk taking.** Sexually victimized women are also more likely to engage in sexual risk taking behaviors. This relationship has been found among sexually victimized college students (Brener, McMahon, Warren, & Douglas, 1999), women sexually assaulted while in the military (Frayne, Skinner, Sullivan, & Freund, 2003), and female prisoners (Mullings, Marquart, & Brewer, 2000). Springs and Friedrich (1992) reported that CSA victims had more sexual partners, were more likely to have been pregnant before age 18, and were younger at age of first intercourse. Zierler and colleagues (1991) found that sexually victimized men and women were more likely to have worked as prostitutes. Among Mexican-American and African-American women with STDs, sexually victimized women were more likely to engage in sex risk behaviors such as earlier intercourse and anal sex (Champion, Shain, Piper, & Perdue, 2001).

**Health Risk Behaviors and Health**

Many health risk behaviors have been identified as having a negative impact on the cardiovascular, immune, and endocrine systems. These include smoking, poorer sleep, poorer diets, alcohol and other drug use, and less exercise. In addition, many of these behaviors are
interrelated. For example, alcohol use is linked with poorer sleep and diet as well as increased risky sex (Maisto, Carey, Carey, Gordon, & Schum, 2004). In their review, Calabrese and colleagues (1987) cited numerous studies relating sleep deprivation, protein caloric malnutrition, heavy cigarette smoking, heavy alcohol use, and opiate addiction to measures of suppressed cellular immunity. Moreover, risky sexual behaviors can lead to sexually transmitted diseases such as HIV/AIDS, pelvic inflammatory disease, and cervical cancer (see review by Rheingold et al., 2004). Health risk behaviors (i.e., sleep amount, balanced diet, regular exercise, smoking, drug use, and excessive drinking) have been further linked in longitudinal studies to adverse changes in physical health status over a two-year period (Wickrama, Lorenz, Conger, Matthews, & Elder, 1997) as well as to mortality in the Alameda County Study (Kaplan, 1992). Given the above outlined relationships between sexual victimization and health risk behaviors and between health risk behaviors and compromised physical health, they will be included in the proposed model.

Relationships among intervening variables

The above review links several psychological and behavioral processes to history/severity of sexual victimization and to health outcome. The subsequent review will link several of these processes to one another and from this review, specific mediational hypotheses are outlined in the next section.

Family distress and depression. In an extensive review on family environment and mental and physical health outcome, Repetti and colleagues (2002) report that family conflict and neglect interfere with development of emotional processing skills and are consistently related to long-term emotional problems, including depression. Yama and colleagues (1993)
similarly found a relationship between family conflict and depression among both CSA victims and non-victims.

*Family distress and LOC.* Family functioning greatly impacts the long-term adjustment of sexually abused children, including how they perceive control in their lives. Moran and Eckenrode (1992) note the finding that externality in children is associated with inconsistent care taking and parental rejection. They also suggest that maltreatment prevents an internal locus of control from developing if it occurs during preadolescence, the time of increasing internality.

*Perceived stress and depression.* Daily hassles and negative life event stress predicted depressive symptomatology in battered women (Campbell, Kup, Belknap, & Templin, 1997), a clinical sample of adolescents (Hoyle, 2000), African-American college students (Duncan, 2000), and African-American women (Cutrona et al., 2005). Importantly, research suggests that daily hassles stress and negative emotionality each contribute unique variance when predicting physical symptoms (Watson & Pennebaker, 1989).

*LOC and depression.* Numerous studies have highlighted the relationship between external locus of control and depression (see review by Benassi, Sweeney, & Dufour, 1988; Vandervoort et al., 1997). Further, Moran and Eckenrode (1992) found that external locus of control was a stronger predictor of depression for maltreated adolescent women than nonmaltreated adolescent women, suggesting that it is especially salient in that population.

*Maladaptive coping and depression.* Aldwin and Yancura (2004) suggest that the relationship between coping and outcome may be mediated by depressive symptoms. For example, they report on findings that avoidant coping was related to increased negative affect, which was related to more physical symptoms in AIDS patients. Further, a recent review
suggests that avoidant coping mediates the relationship between CSA and depression (Whiffen & MacIntosh, 2005).

**Depression and sleep quality.** In another recent review, insomnia was found to be consistently related to depression as well as decreased immune functioning (Taylor, Lichstein, & Durrence, 2003). Moreover, Ironson and colleagues (1997) found that sleep problems mediated between psychological distress and immune functioning after exposure to Hurricane Andrew. Sleep quality also mediated between psychological distress and immune assays among HIV-positive individuals (Cruess et al., 2003).

**Depression and health risk behaviors.** Depression predicts an increase in health risk behaviors across samples. Depression is related to increased likelihood of sexual risk behavior among HIV-positive men and women (Kelly et al., 1993) as well as ethnically diverse adolescents (Jackson, 2005). In the latter study, a dose-response relationship was noted. Regarding depression and increased alcohol use, Williams (1995) suggested that reduced serotonergic functioning found in depression may contribute to increased alcohol consumption. Among traumatized individuals, Rheingold and colleagues (2004) suggest in their review alcohol use serves to quickly reduce negative affect, which is reinforcing in the short-term, and thus maintained as a long-term behavior.

**Rationale**

Despite the amount of research linking specific processes (e.g., maladaptive coping) to trauma exposure and adverse health outcomes, there are few extant models attempting to explain these associations. Schnurr and Green (2004) put forth a comprehensive theoretical model connecting trauma exposure and adverse health outcomes, including the effects of psychological, behavioral, biological (e.g., HPA axis, noradrenergic, and immune alterations) and attentional
(e.g., altered symptom perception, mislabeling) processes. There are four known studies that have used modeling techniques (path analysis or SEM) to empirically evaluate psychological and/or behavioral pathways between trauma exposure and health. One study supported the mediational role of depression (Asmundson, Stein, & McCreary, 2002). Health behaviors did not mediate between trauma and/or health in this or two other studies (Ford, Schnurr, & Friedman, 2004; Schnurr & Spiro, 1999); however, the authors stated that the role of health behaviors needs further evaluation. The final study evaluated the roles of social support, hardiness, and PTSD and found indirect effects of combat on PTSD through hardiness and social support as well as an indirect effect of combat on physical health through PTSD (Taft, Stern, King, & King, 1999). All four studies utilized veteran/military samples and are thus limited in their generalizability to other traumatized populations. Further, the studies were not comprehensive in scope such that they did not include many of the variables thought to be most predictive of adverse health outcome among traumatized individuals.

The proposed study will expand on previous research by (1) comprehensively and simultaneously evaluating important psychological and behavioral processes contributing to the link between trauma and health, and (2) evaluating the most relevant predictors of adverse health outcome among a specified trauma population, namely, sexually victimized women. The processes included in the proposed model were chosen based on their suggested relevance for sexually victimized women. Sexual risk taking, for example, may be an especially relevant behavioral link when examining health outcomes of sexual victimization. This study will use structural equation modeling to examine important psychological (i.e., perceived stress, locus of control, and depression) and behavioral (i.e., maladaptive coping, alcohol use, sexual risk taking, and sleep) pathways between sexual victimization trauma and health outcome.
The Hypothesized Model

The current study proposes a model (see Figure 2) wherein the roles of family conflict, perceived stress, LOC, depression, maladaptive coping, sleep quality, alcohol use, and sexual risk taking are examined as they relate to sexual victimization severity and physical health outcome (see Figures 1 and 2). The model hypothesizes that the presence and severity of sexual victimization in a woman’s childhood or adolescence, in combination with family of origin conflict, places her at risk for increased perception of stress in her daily life, an external perception of control, and use of maladaptive coping strategies. It is hypothesized that, as a result, she is more likely to develop depressive symptoms as well as subsequent health risk behaviors and impaired sleep, which will in turn negatively impact her physical health.

As shown in the figures, several direct and indirect effects are hypothesized. The relationship between sexual victimization and depression is hypothesized to be indirect through the effects of perceived stress, external LOC, and maladaptive coping. Family conflict is hypothesized to correlate with sexual victimization, have a direct effect on depression, as well as have an indirect effect through external LOC. Indirect effects of depression on physical health outcome are hypothesized through increased alcohol use, sexual risk taking, and poor sleep quality. Finally, this proposed model is expected to have adequate fit to the data.
Figure 1. Proposed measurement and structural model for the relationship between sexual victimization and health outcome. Latent constructs are shown in ellipses and observed variables are shown in rectangles.
Figure 2. Proposed model for the relationship between sexual victimization and physical health, showing only the paths between latent constructs.
Participants

Women were recruited from the UGA Psychology research participant pool for a study of “sexual experiences and health” in partial fulfillment of the requirements for introductory psychology classes. Of 886 women screened, data from 737 participants were included in the present analyses (110 women reporting histories of sexual victimization and the first consecutive 627 nonvictims). The data provided by 107 women with sexual victimization histories were previously analyzed (Salstrom, 2004), and a manuscript resulting from that study is currently under editorial review.

Measures

Sexual victimization severity. The Abuse Severity Measure (ASM; Leserman et al., 1997) was used to assess the presence and severity of lifetime sexual and physical victimization. The ASM assesses for the following three abuse characteristics: invasiveness of sexual abuse (i.e., rape vs. touch vs. no abuse), suffering injuries during any of the incidents, and physical abuse involving life threats. The self-report measure was developed following an examination of which dimensions of abuse history have the greatest impact on health outcome. In this initial examination, the authors assessed the impact of physical injury during the abuse, fear of being killed or seriously injured during the abuse, number of perpetrators of abuse, number of incidents of abuse, intrafamilial abuse, knowing the perpetrator, age of abuse onset, number of years since last abuse experience, invasiveness, and number of physical abuse experiences involving life-threatening incidents on a number of health outcome measures. The authors found that the
invasiveness of sexual abuse, suffering injuries during incidents, and physical abuse involving life threats showed significant contributions to poor overall health. Scores can range from 0 (lowest severity or no abuse) to 6 (highest severity).

In this study, women were said to have a sexual victimization history if they reported experiencing a rape or forced sexual touching. They were excluded if they reported experiencing an incident of physical abuse only. Despite the exclusion of physical abuse only victims, if a woman met criteria for sexual victimization, her score on the physical abuse item was included in the sexual victimization severity score in order to maintain the integrity of the scale as it was designed. Supporting construct validation of the measure, Leserman et al. (1997) found that it was moderately correlated with women’s reports of “how much the abuse affects the way they presently live,” (r = .32, p < 0.001).

**Family conflict construct.** The Conflict Behavior Questionnaire (CBQ; Prinz, Foster, Kent, & O’Leary, 1979) consists of 20 items measuring perceived levels of conflict and negative communication between participants and their parents. Items reflect both positive (e.g., “My mom understands me”, “My father listens when I need someone to talk to”) and negative (e.g., “We almost never seem to agree”, “The talks we have are frustrating”) interaction behaviors. Participants were asked to endorse each item as either true or false for their relationship with each parent over the past 2-3 years. Higher scores on the CBQ reflect stronger perceptions of familial conflict. A shorter form of the original 75-item CBQ, the 20 item CBQ retains the items that maximally discriminated between distressed and nondistressed families. The CBQ yields a score which correlates .96 or more with scores from the longer form. Previous research has found this scale to have good internal consistency and test-retest reliability (Foster & Robin, 1988).
The Family Environment Scale (FES; Moos & Moos, 1986) was also used to assess participants’ perceptions of conflict within their family of origin. The self-report FES contains 10 subscales, each containing 9 items: Cohesion, Expressiveness, Conflict, Independence, Achievement Orientation, Intellectual-Cultural Orientation, Active-Recreational Orientation, Moral-Religious Emphasis, Organization, and Control. Subscale scores were obtained by summing the true-false responses to items describing the respective family characteristic. Therefore, scores on each subscale could range from 0-9, with higher scores signifying more of the characteristic. The Conflict subscale included items such as “Family members often criticize each other” and “We fight a lot in our family.” Moos and Moos supported the construct, concurrent, and predictive validity of the FES as well as the construct validity of the Conflict subscale. The FES has shown adequate internal consistency (ranging from .61 to .78), item-subscale correlations (ranging from .27 to .44), and test-retest reliability (ranging from .68-.86) (Moos & Moos, 1994). The Conflict subscale has adequate internal consistency (.75) and 2-month test-retest reliability (.85).

*Perceived stress construct.* The Daily Hassles Scale (DHS, Lazarus & Folkman, 1989) is a 117 self-report questionnaire designed to assess the frequency and severity of stressors or hassles in daily life. Each item presents an irritant ranging from minor annoyances (e.g., misplacing or losing things, wasting time, the weather) to major pressures and problems (e.g., concerns about job security, not enough money for health care). For each item experienced in the past month, participants were asked to respond on a 4-point Likert scale indicating how severe the hassle was (e.g., “Somewhat Severe”, “Moderately Severe”, or “Extremely Severe”). The authors reported adequate test-retest reliability and predictive validity (related to somatic concerns = .40; psychological symptoms = .60).
The Life Events Scale (LES; Sarason, Johnson, & Siegel, 1978) is a 60-item self-report questionnaire that measures life stress through the incidence of life change events. Items that represent life events frequently experienced by the general population were chosen, such as marriage, the death of a family member, changed work situations, and beginning a new school experience. Participants rate each item that they have experienced during the past year on a 7-point scale ranging from “extremely negative” (-3) to “extremely positive” (+3). A positive life events score is obtained by summing the ratings of those events the responder designated as positive; a negative life events score is derived by summing the ratings of those events the responder deemed as negative. Adding these two values gives a total change score. For the present study, the male items of the LES were dropped and only the female items were included, for a total of 54 items. The authors found the LES to be moderately reliable, with test-retest coefficients ranging from .63 to .64. It has also been found to correlate significantly with measures of depression and locus of control, suggesting predictive validity (Dixon & Reid, 2000; Sarason et al., 1978).

Depression construct. The Beck Depression Inventory-II (BDI-II; Beck, Brown, & Steer, 1996) is a self-report instrument commonly used in the research areas of physical health and sexual assault (e.g., Butterfield, Forneris, Feldman, & Beckham, 2000; Campbell & Soeken, 1999). It assesses cognitive/affective and vegetative/somatic symptoms of depression. The 21 items are each scored from 0-3 with a higher summed score representing higher symptomatology. Cut score guidelines for the BDI-II are provided with the recommendation that thresholds be adjusted based on the characteristics of the sample and purpose for use. Scores range from 0 - 63 where scores of 0 - 13 are considered normal, scores of 14 - 19 represent mild
to moderate depression, scores of 20 - 28 represent moderate to severe depression, and scores of 29 - 63 represent severe depression.

Beck and colleagues (1996) reported a coefficient alpha of .92 for an outpatient sample ($N=500$) and a coefficient alpha of .93 for a college student sample ($N=120$). Both exceed coefficient alphas for preceding versions of the BDI. Regarding concurrent validity, BDI-II scores are positively correlated with the Scale for Suicide Ideation ($r=.37$), the Beck Hopelessness Scale ($r=.68$), the Hamilton Psychiatric Rating Scale for Depression ($r=.71$), and the Hamilton Rating Scale for Anxiety ($r=.47$). Cognitive/affective and somatic factors are well-established (Beck et al., 1996).

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) is a 20-item self-report scale designed to measure current levels of depression in the general population. Participants rate their mood during the last week using a 4-point scale (0 = rarely or none of the time to 3 = most or all of the time (5-7 days). An overall score is calculated by summing the ratings of the 20 items. Scores range from 0-60 where higher scores represent greater symptomatology. The CES-D was developed by choosing items from those of previously validated measures, and psychometric properties were determined from three large-scale population surveys. The scale has good internal consistency, ranging from .85 to .90. Test-retest correlations ranged from .45-.70. Good discriminative validity was noted, as the CES-D discriminated well between the general population and psychiatric inpatients. Furthermore, high correlations were found between the CES-D and other measures of depression, such as the Hamilton Depression Rating Scale, representing good concurrent validity. The CES-D has been validated with adolescents (Radloff, 1991).
External locus of control construct. The Adult Nowicki-Strickland Internal-External Control Scale (ANS-IE; Nowicki & Duke, 1974) is a self-report instrument containing 40 forced-choice items designed to assess locus of control orientation. Scores can range from 0 to 40 where higher scores indicate a more external locus of control. The authors state that the reliability and validity data for the ANS-IE (gathered from 12 separate studies) suggest that the ANS-IE is a psychometrically sound measure. Internal consistency was estimated with split-half reliability ranging from .74 to .86 and a test-retest reliability of .83 was found over a six-week period. Significant correlations between the ANS-IE and other locus of control measures indicate good concurrent validity.

The Multidimensional Health Locus of Control scales (MHLC -Form A; Wallston, Wallston, & DeVellis, 1978) were used to measure perceptions of control as related to overall health status. The three subscales of the MHLC are: (1) Internal Health Locus of Control, the belief that one’s behaviors will affect one’s health condition, (2) Powerful Others Health Locus of Control, the belief that powerful others such as doctors, nurses, and family have control over one’s health status, and (3) Chance Health Locus of Control, the belief that one’s health status is due to fate, luck, or chance. Each subscale has six items, for a total of 18 items on the questionnaire. Participants respond to each item on a six-point Likert scale. Scores for each subscale range from 6 to 36, where higher scores indicate stronger beliefs in that source of control. The MHLC scales have been used in numerous studies and have established moderate reliability (Cronbach alphas ranging from .60-.75 and test-retest coefficients from .60-.75). Evidence has also accumulated to support adequate content validity of the MHLC (Wallston, 2005).
Maladaptive coping construct. The Ways of Coping Questionnaire-Revised (WCQ-R; Lazarus & Folkman, 1984) is a 66-item questionnaire that has been extensively used to investigate various coping styles of individuals. Each item presents a specific coping strategy, and participants are asked to respond on a 4-point Likert scale indicating the extent to which they used the strategy in a stressful situation. Lazarus and Folkman identified eight different subscales that can be derived from the WCQ. The WCQ-R has demonstrated good content validity, predictive validity, and internal reliability. Internal reliability ratings of the subscales ranged from .61 to .79.

The Ways of Religious Coping Scale (WRCS; Boudreaux, Catz, Ryan, Amaral-Melendez, & Brantley, 1995) is a 40-item self-report instrument designed to assess the kinds of religious cognitions and behaviors people use to cope with stressful situations. Participants rate each item on a 5-point Likert scale. The total WRCS score indicates the extent to which an individual uses religion to deal with stressful situations. The measure assesses internal/private religious coping (cognitive strategies and beliefs such as prayer and mediation) as well as social/external religious coping (participating in church activities and seeking support from religious leaders). Preliminary studies on the psychometric properties of this scale have established favorable indices of reliability (internal consistency for the total WRCS score, r = .95) and favorable convergent and divergent validity. The WRCS also demonstrates a practical level of discriminant validity when compared with other religious coping measures.

Alcohol use. The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) was used to assess average daily alcohol consumption rates. Derived from the Drinking Practices Questionnaire (DPQ; Cahalan, Cisin, & Crossley, 1969), the self-report scale assesses typical drinking practices during the last month. Adequate convergent validity has been
established with a Pearson’s correlation of .50 ($p = 0.001$) between the DDQ and the DPQ (Collins et al., 1985).

Sexual risk construct. The Scale of Sexual Risk Taking (SSRT; Metzler, Noell, & Biglan, 1992) is a 13-item scale that assesses the occurrence and frequency of various sexual activities (e.g., number of sex partners in last year, nonuse of condoms). The scale was developed by taking items from previously validated measures. Reliability and validity data were gathered from three large adolescent samples. The measure has good internal consistency, ranging from .75 to .90. Both risk-taking indices were significantly correlated with other health risk behaviors, such as smoking, alcohol use, and drug use, suggesting acceptable construct validity. In the present dataset, two items were dropped after data collection due to non-random missing data for those items.

Sleep quality construct. The Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) is an 18-item self-report inventory that assesses sleep quality and disturbances during the past month. There are 7 component scores and a global score ranging from 0 to 21 (higher scores represent poorer sleep quality). A PSQI global score of 5 differentiates between “good” sleepers and “bad” sleepers with a diagnostic sensitivity of 90% and specificity of 87%. The measure has good test-retest reliability ($r = .85$). It has been used with sexual assault survivors in a previous study (Krakow et al., 2001).

Health outcome construct. The Cornell Medical Index (CMI; Abramson, Terespolsky, Brook, & Kark, 1965) is a systematic review of body systems (eyes and ears, respiratory, cardiovascular, gastrointestinal, musculoskeletal, skin, nervous system, and genito-urinary) and was used to measure physical health status. Items correspond closely with those normally asked during a comprehensive medical interview. High concurrent validity ($r = .83$) between the CMI
and physicians’ clinical evaluations was reported. Validity is further supported by high sensitivity (76%) and specificity (70%) of CMI scores for women in relation to overall ill-health.

The CMI items assessing mental health were not administered because they are redundant with those in other measures. The remaining 122 items were supplemented by the following 6 items to further assess gynecological dysfunction: “Within the past 12 months have you had vaginitis or yeast infections?,” “Do you experience pain during intercourse?,” “Do you experience a lack of sexual pleasure?,” “Have you had ovarian cysts?,” “Do you have irregular periods?,” and “Do you experience excessive menstrual bleeding?” Scores ranged from 0-128.

Items assessing pain in several body regions were taken from the Recent Health History Questionnaire (Fillingim, Wilkinson, et al., 1999). Instances of the following types of pain occurring within the last month were evaluated: headache, back pain, muscle pain, joint pain, stomach pain, dental pain, and premenstrual or menstrual pain. Summary scores were computed representing the total number of pain sites, total number of pain episodes, pain duration, and the average severity of the pain (0-100). The measure has been used in multiple studies examining pain (Edwards & Fillingim, 1999; Fillingim, Edwards, & Powell, 1999; Fillingim, Edwards, & Powell, 2000).

General health perceptions were assessed with the RAND Health Insurance Experiment (HIE) health perceptions battery (Davies, Sherbourne, Peterson, & Ware, 1988), which was developed directly from the Health Perceptions Questionnaire (HPQ). The 22 items are rated from 1 (definitely false) to 5 (definitely true). The HPQ includes one overall index, the General Health Ratings Index (GHRI), and six subscales. Scores on the GHRI are achieved by summing item scores. The GHRI can range from 22 to 110.
Validity studies have found that the GHRI is a sensitive measure of individual differences in disease status, limitations in physical and role functioning due to poor health, and acute physical and psychosomatic symptoms (as cited in Davies et al., 1988). It is also largely related to later use of medical services and has substantial incremental validity in these predictions. Preliminary findings of other validity studies conducted by the same researchers indicate that the GHRI is able to discriminate between those with and without chronic disease as well as individual differences in disease severity. Reliability studies of the HIE health perception measures indicate that the GHRI has high internal consistency (GHRI = .89) and adequate one-year stability (GHRI = .67). Hennesey, Moriarty, Zack, Scherr, & Brackbill (1994) cite findings suggesting that self-perceived health is strongly related to an individual’s objective physical health status and is an independent predictor of mortality.

Functional disability was evaluated with the following question taken from the Health-Related Quality of Life measure (HRQOL; Hennesey et al., 1994): “During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, (studying, going to school), or recreation?” The authors report that this measure of functional disability is similar to the measure used in the National Health Interview Survey by the CDC. They also cite research indicating the link between self-reported disability days and objective measures of health dysfunction. Possible scores ranged from 0-30.

Health service use was assessed with the following questions: “How many times have you been to the doctor in the last six months (for reasons other than a routine check up)?” and “How many times have you been to another health care provider in the last six months (e.g., chiropractor, physical therapist, etc.).” Raw scores on these items were summed to create a medical utilization score with a lower limit of zero and no defined upper limit.
Procedure

The present study will use data collected from October 2002 until April 2003. Participants granted informed consent and then completed the above questionnaires in group (20-40 students per testing) format. The questionnaire packet was anonymous to help prevent possible social desirability effects. Further, instruments were randomly ordered within the questionnaire packet in order to reduce response bias.

Data Analysis

Structural equation modeling (SEM) was used to examine the proposed model. Advantages of SEM include the ability to simultaneously evaluate hypothesized relationships among latent constructs without the confounding effect of measurement error. Further, fit indices are offered as a measure of how accurately the hypothesized model fits the data. All analyses were conducted using LISREL 8.5 software (Joreskog & Sorbom, 2002). In order to account for missing data, the maximum likelihood (ML) missing data imputation procedure was used. This method is robust against moderate violations of normality, however, skewness and kurtosis may lead to an overestimation of the chi-square fit index, making model rejection more likely (West, Finch, & Curran, 1995). Compared to other methods available, (e.g., pairwise and listwise deletion), ML estimates are unbiased and have a reduced likelihood of convergence failure (Enders & Bandalos, 2001; Gold & Bentler, 2000). Specifically, the expectation-maximization (EM) algorithm, which computes a casewise likelihood function, was used.

Measurement model. First, summary statistics and bivariate correlations were computed for all variables included in the measurement model. Next, a measurement model assessing the relationships between the latent constructs and observed indicators was estimated using confirmatory factor analysis (see Figure 1). Of interest was the factor loading of the observed
indicator on the construct of interest, as well as overall model fit. Each indicator’s factor loading, along with its common variance with other indicators, identifies the latent construct. In this study, each latent variable in the hypothesized structural model was composed of at least three observed indicators with the exception of sexual victimization and alcohol use. The latter two constructs were each identified using a single indicator.

The measurement model contained ten constructs altogether. The total ASM severity score was used to wholly represent the sexual victimization construct. There were three indicators of the depression construct: two BDI factors (cognitive/affective= 14 items and somatic= 5 items) (Whisman, Perez, & Ramel, 2000) and the CESD total score. Scores from the CBQ-Mother and CBQ-Father versions were used as two indicators of the family conflict construct, and the FES Conflict subscale was used as the third. The perceived stress construct was represented by the DHS severity index, the LES positive life events score and the negative life events score. The ANS-IE total score and the externally-based (Powerful Others and Chance) MHLC subscale scores were used as three indicators of the external locus of control construct. The WCQ-R Escape-Avoidance and Confrontive coping subscales as well as the WRCS total score (expected to load negatively) were used as indicators of the maladaptive coping construct. From the DDQ, the average daily consumption measure was used as a single indicator for the alcohol use construct. Regarding the sexual risk taking construct, three component scores were created using the random assignment parceling technique (Little, Cunningham, Shahar, & Widaman, 2002). The three indicators of the sleep quality construct were created by combining the seven PSQI component scores (e.g., components 1 and 2 and 6 summed = indicator 1). The health outcome latent variable was represented by five manifest indicators: physical symptoms (CMI total score), medical utilization (two summed items), pain (RHHQ total number of pain
sites score), health perceptions (GHRI recoded so that higher scores represent worse perceptions), and functional disability (HRQOL item).

*Structural model.* The proposed structural model (see Figure 2) was evaluated in order to examine indirect and direct relationships among latent constructs as well as determine the fit of the model. LISREL provides numerous goodness of fit indices, which compare the covariance matrix implied by the hypothesized model to the covariance matrix for the actual variables contained in the data. The chi-square statistic, the traditional fit index, reflects the amount of discrepancy between the implied and observed covariance matrices. Therefore, a statistically nonsignificant chi-square fit index should suggest a well-fitting model, and rejection of a model would result from a statistically significant chi-square. However, this method is considered unrealistically stringent and heavily dependent on sample size resulting in the rejection of adequate fitting models (Bentler & Bonett, 1980). As such, several goodness of fit indices have been developed to supplement the chi-square statistic. The following indices and cutoffs were used to determine model fit in this study (Marsh, Hau, & Wen, 2004; Vandenberg & Lance, 2000): root mean square error of approximation (RMSEA; .08 or less represents acceptable fit; Steiger, 1990), non-normed fit index (NNFI; .90 or higher indicates that the model cannot likely be significantly improved upon; Bentler & Bonett, 1980), comparative fit index (CFI; .90 or higher represents acceptable fit; Bentler, 1990), and the standardized root mean square residual (SRMR; .08 or less represents acceptable fit; Bentler 1995). These indices differentiate between well-fitting and poor-fitting models by considering degrees of freedom, model complexity, model misspecifications, sample size, and potential for replication (Vandenberg & Lance, 2000).
CHAPTER 3

RESULTS

Descriptive Statistics

Mean age of participants was 19.24 years \((SD = 1.29)\). The participants were predominantly Caucasian (87\%), while 5\% were African American, 4\% were Asian American, 1\% were Latina, and 3\% were of other ethnic heritage. Students were predominantly from upper-middle class families, with the majority of students reporting a gross family income of $60K/year or higher. Of the women who reported experiencing sexual victimization \((N=110)\), 44\% reported rape (i.e., responded positively to the following item: “Has anyone made you have vaginal or anal sex by using force or threatening to harm you?”) as their most intrusive form of sexual victimization with age of first occurrence ranging from 6-19 years. The remaining 56\% of victims reported that they had been touched inappropriately (i.e., responded positively to the following item: “Has anyone ever succeeded in touching the sex parts of your body by using force or threatening to harm you?”) with age of first occurrence ranging from 4-22 years. See Tables 1 and 2 for intercorrelations, means, standard deviations, and ranges for all study variables.

Measurement Model

Overall, the measurement model (see Figure 3) showed good fit, suggesting that the indicators chosen loaded on their respective constructs in an adequate manner. Following are a few results worth mention. In cases where item overlap could cause certain indicators, such as BDI somatic factor and sleep quality, to load more heavily on alternative constructs, such as health outcome, this did not occur. This supports the value of including each factor as a
conceptually distinct construct. The path coefficient between SV and perceived stress was unusually high at .99; however, the t-value is actually modest compared with those of similar coefficients, which is likely due to a large standard error. Within this measurement model, a few indicators (i.e., religious coping, positive life events, and health locus of control-powerful others) did not load as predicted. Finally, despite the range of health outcome measures chosen, all five indicators loaded on the construct as predicted, which provides support for health outcome as a construct that subsumes a variety of health effects.

Structural Model

Tests of overall fit for the model predicting health outcome (see Figures 3 and 4) suggest that the implied model fits the data reasonably well (see Table 3). As anticipated, the chi-square index was significant as it is sensitive to sample size; however, the other indices overall suggest a good fitting model. Given acceptable fit of the model, indirect and direct effects were examined according to study hypotheses. As shown in Figures 1 and 2, several direct and indirect effects were hypothesized. Family conflict was hypothesized to have a direct effect on depression as well as an indirect effect through external LOC. This hypothesis was not supported as neither the direct nor indirect effect was significant, although relationships between family and external LOC and between external LOC and depression were significant. As expected, family conflict and sexual victimization were significantly correlated. The relationship between sexual victimization and depression was hypothesized to be indirect through the effects of perceived stress, external LOC, and maladaptive coping. As can be seen in Figure 4, this hypothesis was supported in that the total indirect effect of sexual victimization on depression was significant (indirect effect = .80; \( p < .01 \)). Within this system, perceived stress appeared to be largely responsible for this effect (.69), as the strength of the relationship between SV and
perceived stress as well as between perceived stress and depression was stronger in magnitude than those of the other two intervening variables. Of note, the relationship between maladaptive coping and depression was not significant in the presence of the external LOC and perceived stress.

An indirect effect of depression on physical health outcome was hypothesized through increased alcohol use, sexual risk taking, and poor sleep quality. This hypothesis was supported in that the total indirect effect of depression on health outcome was significant (indirect effect = .73; \( p < .01 \)). Specifically, alcohol use and poor sleep quality were primarily responsible for this mediated effect. Sexual risk taking was not significantly related to health outcome in the presence of alcohol use and poor sleep quality. Finally, as expected, the total indirect path between SV and health outcome was significant (indirect effect = .59; \( p < .01 \)).
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Table 2  
*Intercorrelations for All Study Variables*

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Note. N = 737. BDI=Beck Depression Inventory; CESD=Center for Epidemiologic Studies Depression Scale; FES=Family Environment Scale; DHS=Daily Hassles Scale; LOC=Locus of Control; WRC=Ways of Religious Coping; SSRT= Scale of Sexual Risk Taking; PSQI=Pittsburgh Sleep Quality Index; Correlation coefficients.08 and above are significant at the .05 level.
Table 3
*Summary of Model Fit Indices*

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<th>Model</th>
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*Note. MFF $\chi^2 =$ Minimum Fit Function Chi-Square; RMSEA = Root Mean Square Error of Approximation (.08 or less indicates acceptable fit); NNFI = Non-Normed Fit Index (.90 or higher indicates acceptable fit); CFI = Comparative Fit Index (.90 or higher indicates acceptable fit); SRMR = Standardized Root Mean Square (.08 or less indicates acceptable fit); $p < .05*.$*
Figure 3. Measurement and structural model testing relationship between sexual victimization and health outcome (N = 737). Parameter estimates are standardized, and significance levels were determined by critical ratios. *p < .05, **p < .01. *Note. This was the referent indicator.
Figure 4. Model testing relationship between sexual victimization and health outcome (N = 737). Parameter estimates are standardized, and significance levels were determined by critical ratios.

*p < .05., **p < .01.
CHAPTER 4
DISCUSSION

This study tested a model examining important psychological (i.e., perceived stress, locus of control, and depression) and behavioral (i.e., maladaptive coping, alcohol use, sexual risk taking, and sleep) pathways between sexual victimization and health outcome. Importantly, a significant total indirect effect was found for SV on health outcome, indicating that, even in a youthful sample, a relationship exists between trauma and health outcome warranting further research. Consistent with hypotheses, a mediated effect was found for the relationship between sexual victimization and depression as well as between depression and health outcome. Specifically, the indirect effect of SV on depression was primarily due to the effects of perceived stress. Similarly, the indirect effect of depression on health outcome was primarily due to the effects of alcohol use and poor sleep quality. The present study is the first to use SEM to evaluate important predictors of health outcome among sexually victimized women and their non-victimized peers. Previous studies in the area of SV and health have not tested a comprehensive structural model wherein relevant variables are entered simultaneously. Further, only a few studies in the broader area of trauma and health have utilized modeling techniques.

Consistent with previous research, family conflict was significantly correlated with SV (Meyerson, Long, Miranda, & Marx, 2002). However, the direct effect of family conflict on depression was nonsignificant, which is inconsistent with the well-established finding that conflict in the family of origin is related to long-term emotional problems, including depression (Repetti et al., 2002). Levels of family of origin conflict reported in this homogenous sample of upper-middle class women ($M=3.07$) are more similar to “normal” families ($M=3.31$) than to
“distressed” families ($M=4.28$) (Moos & Moos, 1986), possibly indicating that levels of conflict were not severe enough to result in long-term psychological distress. Although relationships between family conflict and external LOC and between external LOC and depression were significant as expected, coefficients were not high enough in magnitude to produce a significant indirect effect of family conflict on depression.

As expected, mediated effects were found for perceived stress and external LOC in the link between SV and depression. The relationships between SV and perceived stress and between perceived stress and depression were particularly strong. These results are consistent with previous findings suggesting that sexually victimized women may be especially vulnerable to the effects of daily stressors (Thakkar & McCanne, 2000). Findings of this study suggest a modest mediational role for external LOC, supporting as well as extending previous results (McNaughton, Patterson, Smith, & Grant, 1995; Moran & Eckenrode, 1992). As expected, there was a strong link between SV and maladaptive coping. However, a mediated effect for coping was not found in the presence of perceived stress and external LOC as the relationship between coping and depression was nonsignificant. This is inconsistent with previous research (Whiffen & MacIntosh, 2005) and could be related to the way in which the construct was operationalized.

As noted above, an indirect effect was found for depression on health outcome with alcohol use and poor sleep quality functioning as the primary intervening variables. As expected, symptoms of depression predicted increased sexual risk taking, alcohol use, and poorer sleep quality, and, in addition, alcohol use and sleep quality predicted health outcome. However, sexual risk-taking, when modeled simultaneously with alcohol use and sleep quality, was unrelated to health outcome in this sample. It is possible that these behaviors were not yet chronic and thus did not yet have a detectable impact on health. In contrast, higher levels of
weekly alcohol consumption were strongly related to poor physical health even in this young sample. It is likely that continued use will produce even more prominent long-term health effects, as can be seen in veteran populations (see Rheingold et al., 2004 for review). The mediational role of alcohol use is consistent with Flood’s (2003) study showing that this health risk behavior mediated between PTSD and certain health outcomes among college students yet inconsistent with the results of Schnurr and Spiro (1999), who found that alcohol use did not mediate between PTSD and health outcome among older veterans.

As noted above, a significant indirect effect for sleep quality was found. Depression strongly predicted poor sleep quality in this sample. In some cases, this link may be due more to measurement overlap than to actual relationship. However, as previously mentioned, good fit of the measurement model implies that sleep disturbance and depression are conceptually distinct constructs, which is consistent with research suggesting that poor sleep is more complex than simply another symptom of depression (Krakow et al., 2001). Also consistent with previous research is the strong link between sleep quality and health (e.g., Cruess et al., 2003). Findings of this study suggest a mediational role for sleep quality, supporting as well as extending previous results.

Despite this study’s strengths, such as the use of structural equation modeling, some limitations warrant mention. The present analyses were conducted using self-report data from a homogeneous, non-clinical sample. Common method variance represents a potential limitation. Moreover, diagnoses of depression and alcohol use were not obtained. Due to the cross-sectional, correlational design of the study, temporal sequence and therefore, causal relationships, cannot be established. Further, the potential for unmeasured variables influencing health (e.g., inherited
medical conditions) exists. These results may not be generalizable to all traumatized groups (e.g., veterans).

Future research should prospectively examine the impact of sexual victimization on physical health in order to clarify the direction of the observed relationships. For example, it may be that individuals with more mental and physical health problems are more likely to engage in high-risk behaviors, and thus may experience more traumatic life events. Further, multi-method assessment measures should be used in future research, such as physician diagnoses as a measure of health outcome. An examination of gender differences is also warranted, as differences may exist regarding pathways to poor health and the type of consequent health problems that are most prevalent. Investigations of the impact of trauma and subsequent psychological difficulties on health should also compare interpersonal traumas, such as sexual victimization, to such traumas as natural disasters and motor vehicle accidents in order to further our understanding of generalizability across trauma types. It may be that mechanisms linking interpersonal trauma to health are different than those for non-interpersonal traumas.

In conclusion, even in a youthful and generally healthy sample of women, severity of sexual victimization was related to poor health outcome. Primary hypotheses were supported, suggesting the importance of both psychological and behavioral pathways. It is likely that, for those whose psychological difficulties and high-risk health behaviors persist, these relationships will become more pronounced and poor physical health more ubiquitous. Psychological difficulties are not suggested to cause physical conditions per se; however, they may strain body systems, causing sustained allostatic load (Friedman & McEwen, 2004) and in so doing, prompt diminished immune functioning and exacerbate illness. The present study generally supports pathways proposed within Schnurr and Green’s (2004) theoretical model. The model suggests
that trauma exposure is related to increased psychological distress and that psychological distress is related to health risk behaviors, which in turn predict illness behavior and morbidity.

Implications of the present findings include the importance of considering mental health conditions, such as depression, when evaluating physical health problems, even among young trauma survivors. Brief screening for mental health difficulties and for traumatic events may be useful not only in specialized and community medical centers, but also in university medical centers. Findings of this study also highlight the usefulness of an integrated model of care (Schnurr & Green, 2004). The authors emphasize several benefits of this model, including: 1) patients often view mental and physical health symptoms in an undifferentiated form; 2) many patients prefer to receive mental health treatment in primary care settings; 3) treatment adherence is likely improved by having mental health professionals closer to how patients initially present; 4) most patients do not follow up on mental health referrals. Early mental health intervention with young adults, especially those who have been traumatized, could help prevent chronic psychological conditions from developing, thereby lessening the impact on physical health as well as health care cost and utilization.
REFERENCES


status among HIV-positive men and women on combination antiretroviral therapy.

*Journal of Psychosomatic Research, 54*, 185-190.


