The Interplay of Life Stressors and Coping Resources: Implications for Health

Aaron M. Ogletree

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Rosemary Blieszner (Co-chair)

Laura P. Sands (Co-chair)

Rachel A. Pruchno

Karen A. Roberto

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ABSTRACT

Adults aged 50 years and older are a growing segment of the population and are more likely than their younger counterparts to experience significant stressors such as the death of a relative or friend, onset of chronic conditions, and increased health burden. The current studies use Pearlin's stress process model to evaluate the impact of these stressors on outcomes of depression. Study 1 used Wave 1 data from the ORANJ BOWL research panel of 5,688 New Jersey residents aged 50 and older to explore the relationship between relational life events, private religious practices, and depressed mood. Cross-sectional structural equation modeling was used to evaluate these relationships. Results showed that relational life events had a significant positive influence on depressive symptoms and this relationship was partially mediated by private religious practices. Findings indicate that non-personal life events are important sources of stress that may otherwise be overlooked when assessing risk factors among older adults. Study 2 used data from 640 men from the Research on Older Adults with HIV (ROAH) study to evaluate the impact of HIV-related health burden on depressed mood and to assess the mitigating effects of social support adequacy. Structural equation modeling showed that greater health burden was associated with more depressive symptoms; this relationship was significantly partially mediated by emotional support adequacy, which was a measure of unmet social need. Findings indicate that health burden has a cumulative impact on psychological health and programs and supports that target social wellness can improve this relationship. These studies point to the importance of understanding sources of risk and resilience among older people and in an attempt to improve overall health outcomes.

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GENERAL AUDIENCE ABSTRACT

Older adults constitute a growing portion of the population in the United States and around the world. Better understanding of challenges older adults face, including stressful life events and changes in health, could contribute to better outcomes in their later years. Two studies were designed to: (1) understand the relationship between events that affect one's friends and family (i.e., relational life events) and feelings of depression, and explore whether religious expression is useful in reducing stress; and (2) evaluate the influence of health burden on feelings of depression in older adults with HIV and understand how social support can reduce stress from living with HIV. Data for this work come from the ORANJ BOWL research panel of interviews with 5,688 New Jersey adults and the Research on Older Adults with HIV (ROAH) study of 914 New York City residents aged 50 and older with HIV in 2005. Findings from the first study show that relational life events are associated with more depressive symptoms and more private religious expression. Thus, relational life events are an important risk factor to which family members and health service providers should pay attention. Findings from the second study demonstrate that more health difficulties in people with HIV is associated with more depressive symptoms. This is especially true when self-rated health is poorer and the number of overall chronic conditions are greater. Social support is an important resilience factor that lessens the influence of health burden on psychological health, so relatives and service providers should promote social wellness in addition to HIV treatment-specific interventions. Together, the results of these studies reveal numerous risk and resilience factors to consider when working to improve the lives of older people.

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Attributions

Manuscript I

Aaron Ogletree is the primary author who conceived of the hypotheses, performed all statistical analyses, and wrote the paper. Rosemary Blieszner and Laura Sands supervised the planning of the study, oversaw analyses, and contributed to revising the paper. Rachel Pruchno gathered the original data, oversaw planning for the study, and contributed to revising the paper. Tina Savla oversaw statistical analyses and contributed to revising the paper.

Manuscript II

Aaron Ogletree is the primary author who conceived of the hypotheses, performed all statistical analyses, and wrote the paper. Mark Brennan-Ing, Rosemary Blieszner, and Laura Sands supervised the planning of the study, oversaw analyses, and contributed to revising the paper. Steve Karpiak gathered the original data and contributed to revising the paper.

INTRODUCTION

A growing body of research underscores the importance of investigating the causes and consequences of health changes among older adults. The number of adults aged 65 and older worldwide is expected to double from 8.5% (617 million) to 16.7% (1.6 billion) by 2050 (U.S. Census Bureau, 2016). These adults are more likely than their younger counterparts to experience health- and social-related stressors, which are known to lead to higher rates of depression (Fiske, Wetherall, & Gatz, 2009), unmet need (Sands et al., 2006), and hospitalization (Xu, Covinsky, Stallard, Thomas, & Sands, 2012). As this segment of the population grows, it is increasingly important to understand factors that influence the relationship between stressors and outcomes of health. Such a focus necessitates exploration of potentially modifiable factors (e.g., coping resources), which can influence better health despite greater levels of stress. Thus, the primary goals for this dissertation are to explore the impact of life stressors on depressive symptoms and to evaluate mechanisms that might change this relationship. In the sections ahead, I provide an overview of Pearlin and colleagues' stress process model (Pearlin, Menaghan, Lieberman, & Mullan, 1981) as it applies to developing a better understanding of stress and coping among adults aged 50 and older. Then, I will outline the studies that constitute this dissertation and illustrate their relation to the overall goals of this work.

The Stress Process

Early research on stress, pioneered by scholars such as Cannon (1935) and Selye (1956), was guided by the assumption that exposure to excessive stimuli elicits stress reactions because individuals innately have an aversion to change (Pearlin et al., 1981). That is, life changes are sources of stress because they introduce opportunities for discontinuity and necessitate readjustment. It was upon this premise that Pearlin and his colleagues developed the early

foundation of the stress process model. Pearlin's work represented a radical "shift [in] the sociological study of mental health from an emphasis on psychiatric disorders to a focus on social structure and its consequences for stress and psychological distress" (Avison, Aneshensel, Schieman, & Wheaton, 2010, p. v). Indeed, the stress process model presented a uniquely developmental approach to understanding individual risk and resilience over time and under the influence of social forces.

There are a number of ways in which the stress process model is suited to guide research on stress and coping across the lifespan. In its simplest form, this framework for the stress process consists of three major components: stressors, mediators and moderators of stress (e.g., coping resources), and health outcomes (Pearlin et al., 1981). Pearlin's model situates the interplay of life stressors and coping within larger contexts of family and society and utilizes a developmental approach to explore the influence of stressors on trajectories of well-being.

Clear parallels can be drawn between Pearlin and colleagues' delineation of the stress process and the developmental perspectives of Baltes (1987) and Elder (1974). For instance, both life course and lifespan developmental theories purport that age-related changes are situated in context and can differ based on psychological, social, and instrumental resources (Pearlin & Skaff, 1996). From a stress process perspective, individuals may have more resources (e.g., expanded opportunity structures) or fewer resources (e.g., constrained opportunity structures). Those with expanded opportunity structures have more resources available for coping with significant life stressors whereas those with constrained opportunity structures have restricted access to resources, thus potentially leading to worse mental health following significant life stressors. Ferraro and Shippee (2009) describe the process whereby opportunity structures influence exposure to stressors, access to resources, and trajectories of wellness as cumulative

inequality (CI). Other examples of factors that influence opportunity structures include social networks, disease status, and age. Together, the perspectives of Pearlin, Baltes, Elder, and Ferraro are united by their complementarity in (a) examining the influence of life stressors on health outcomes across adult development, (b) describing resources that mitigate the influence of stressors on health, and (c) evaluating contexts and conditions under which development occurs. Although this dissertation focuses on the stress process model primarily for theoretical grounding, indeed, the implications of this dissertation work extend to other major theories in social gerontology.

The Present Studies

Manuscript I. It is increasingly important to understand factors that influence the relationship between stressors and outcomes of health; factors that might influence this relationship include coping resources, such as private religious practices. The first study in this dissertation uses the stress process model to explore associations among relational life events as relationship-level stressors, private religious practices as coping resources, and depressive symptoms as the outcome. Pearlin's model is suited to explore the relationship between relational life events, private religious practices, and depressed mood for a number of reasons. First, relational life events, which are non-personal events affecting a friend, relative, or loved one, are more common among adults over 50 (Blazer, 2003; Wrzus, Hänel, Wagner, & Neyer, 2013) when compared to younger adults. This focus on relational life events ties well with Elder's notion of linked lives (Elder, 1974), which purports that developmental trajectories and outcomes are influence by those with whom our lives are shared. The outcome variable, depression, provides assessment of whether stressful events affecting friends and relatives have a measurable influence on well-being.

Second, religious practices are among the most widely utilized coping resources in later life (Kennedy, Kelman, Thomas, & Chen, 1996). Older adults with expanded opportunity structures, conceptualized here as having fewer relational life events and more religious practices, are likely to report fewer depressive symptoms than adults with constrained opportunity structures (e.g., more stressors and fewer resources). As a coping resource, religious expression should mediate the relationship between relational life events and depressive symptoms such that those who report both more relational life events within the past year and more private religious expression should also report fewer depressive symptoms than those who report less private religious expression. This study is among the first to evaluate these associations.

The sample for the first study originates from Wave 1 of the ORANJ BOWL (Ongoing Research on Aging in New Jersey: Bettering Opportunities for Wellness in Life) research panel. This sample includes 5,688 adults aged 50 to 74 years who are community-dwelling and dispersed throughout the state of New Jersey. Participants were recruited through random digit dialing (RDD) techniques; full recruitment information is available elsewhere (Pruchno, Wilson-Genderson, & Cartwright, 2010). Because this large representative sample comprised adults living independently in the community, findings from this study, particularly focusing on the impact of relational life events, may have more ecological validity than if they originated from institutionalized or convenience samples (Coleman, 2015). Further, the large sample size allows for complex statistical analyses and greater generalizability of the findings.

Manuscript II. In contrast to the first study, the second study in this dissertation shifts the emphasis to individual-level stressors and social coping resources in a more narrowly-focused sample. It applies the stress process model to an evaluation of the influence of health

burden (e.g., age-related chronic conditions, HIV-related conditions, and self-rated health) and support adequacy on depressive symptoms. A large literature documents the influence of health decline and chronic disease burden on depressed mood (Sangarlangkarn & Appelbaum, 2016), particularly among people with HIV (Millar, Starks, Gurung, & Parsons, 2017). However, little research has evaluated the influence of adequate instrumental support (i.e., help around the house) and emotional support (i.e., having someone to talk to) on the relationship between health burden and depressive symptoms in older HIV-positive men. Less adequate support is a measure of unmet social need that reflects constrained opportunity structures; that is, individuals without adequate support may be deficient in the resources available to manage chronic health strain. As such, according to Pearlin's model, more stress and fewer resources should result in more depressed mood.

Pearlin's model is further suited for an exploration of HIV and aging due to its focus on social context. The sample in this study consists of 640 HIV-positive men aged 50 to 78 from the Research on Older Adults with HIV (ROAH) project, 74% of whom identified as members of racial or ethnic minority groups. Despite these men surviving into the second half of life, a diagnosis of HIV is still perceived as a terminal illness that is associated with sexual minority identity and stigma (Porter, Brennan-Ing, Burr, Dugan, & Karpiak, 2017). An additional factor that constrains opportunity structures is the effect of minority status (e.g., age, social class, race or ethnicity, and sexual orientation) on access to social supports and on barriers to care, which is especially applicable among older people with HIV who are experiencing *accelerated* health decline. That is, studies show that older people with HIV experience an earlier onset of chronic conditions and multimorbidity while also reporting more constrained opportunity structures and fewer resources than their non-HIV-infected counterparts (High et al., 2012). Indeed, older

people with HIV report fewer social supports (Grov, Golub, Parsons, Brennan, & Karpiak, 2010; Smith, Rossetto, & Peterson, 2008), worse health (High et al., 2012), and stigma as a barrier to care (Stringer et al., 2016). Based on these intersecting conditions, a focus on HIV among people aged 50 and older is a model of accelerated aging within the context of significant stigmatization.

In summary, innovative research based on the stress process framework can identify mechanisms linking poor health outcomes and stressors in late life and delineate the risks that are most detrimental to well-being and the sources of resilience that are most valuable for well-being. Understanding the combined influence of stressors and coping resources on health outcomes can inform families, clients, and community advocates about factors that reduce the impact of stressors (e.g., emotional and instrumental support from friends, families, and religious organizations), and may provide direction for developing policy recommendations and interventions. Researchers and practitioners might use this approach to break "chains of risk" (Pearlin, 2010) and alter the influence of early stressors on the proliferation and accumulation of stress across the life course, which is the goal of the present studies.

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MANUSCRIPT I:

The contribution of relational life events to depressed mood and the impact of private religious practices

IRB approval #15-881

Abstract

Objectives: Life events have a significant impact on depressive symptoms, but little research has explored relational life events—non-personal events revolving around the health and well-being of a friend or relative. Even less research has explored the indirect effect from relational life events to depression via private religious practices, which are common coping mechanisms for adults over 50.

Method: We used cross-sectional data for 5,442 adults aged 50-74 from the ORANJ BOWL research panel to determine (a) the direct effect from relational life events to depressive symptoms and (b) the indirect effect from relational life events to depressive symptoms via private religious practices.

Results: Results show that the incidence of relational life events was associated with more depressive symptoms and more public religious practices. A significant indirect effect suggests that participants who reported more private religious practices had greater levels of depressive symptoms.

Discussion: Findings indicate that relational life events can be important determinants of well-being. Similarly, private religious practices may be utilized by those who experience more stressors, which explains the positive relationship between religion and depressed mood in this study.

Introduction

Older adults with multiple symptoms of depression are at higher risk for disability (WHO, 2017), mortality (Murphy et al., 2016), and higher health care expenditures (Unützer et al., 2009) than those who report no or few depressive symptoms. Compared to younger adults, those aged 50 and older are more likely to experience events that can lead to depressive symptoms such as the death of a loved one, changes in health and functioning (Wilson-Genderson, Heid, & Pruchno, 2017), and providing care for a friend or relative. Many who experience these negative life events turn to religious expression to cope. We use the stress process framework to explore associations among life stressors, coping resources, and depressive symptoms in adults over age 50. Specifically, we evaluate the direct and indirect relationships among life events, depressive symptoms, and private religious expression.

Pearlin's Stress Process

The stress process model (Pearlin, Menaghan, Lieberman, & Mullan, 1981) addresses sources of stress, mediators and moderators of stress, and outcomes of health and well-being. Within this framework, stressors such as life events are risk factors for poor health. However, this relationship can be attenuated by psychosocial resources that change or influence the impact of stressors on outcomes of health. Pearlin's model guided this investigation of the associations among relational life events, private religious practices as a coping resource, and depressive symptoms as a measure of mental health.

Relational Life Events

Although a number of studies have established a significant direct relationship between negative life events and depression in older people (Blazer, 2003), few have focused specifically on relational life events. Life course scholars have demonstrated that individual well-being is tied

to those with whom one's life is linked (Elder, 1998). As such, life event research should move beyond personal, individual-level stressors to evaluate the implications of loved ones' significant life events for one's own health and well-being, especially the negative ones. Negative relational life events revolve around changes in the health and well-being of a friend or relative, including death, divorce (Wrzus, Hänel, Wagner, & Neyer, 2013), onset of illness, and increased need for care (Pruchno, Heid, & Wilson-Genderson, 2017). Negative relational life events can lead to reduced social engagement, fewer social connections, and loss of social support. Though the relationship between personal life events and depressed mood is well known, few studies have considered the impact of cumulative relational life events on depressive symptoms. Further, to the best of our knowledge, no studies have explored factors that mediate the effects of negative relational life events on depression.

Private Religious Practices

Religion and spirituality are the most widely studied coping resources among older adults, largely because religious institutions are the most widely available social organization for current cohorts of older people (Kennedy, Kelman, Thomas, & Chen, 1996). Spirituality constitutes individual beliefs and private practices whereas religion reflects organizational systems of belief and shared public practices (Hill & Pargament, 2003). A large literature links both public and private domains of religion and spirituality with better health outcomes. Researchers often report better psychological and physiological health among those who attend church services than those who do not (Hybels, Blazer, George, & Koenig, 2012; Kennedy, Kelman, Thomas, & Chen, 1996; Koenig, King, & Carson, 2012). This finding is, in part, due to the relationship between church attendance and social resources. Indeed, greater levels of religiosity and church attendance are consistently associated with more social resources and

better psychological health (Green & Elliott, 2010; Hayward & Krause, 2013; Horning, Davis, Stirrat, & Cornwell, 2011; Koenig, George, & Titus, 2004;).

However, studies focusing on private religious practices such as prayer, reading religious texts, and listening to religious programs yield mixed results. Older adults who exhibit high levels of private religious practices, including meditation and mindfulness exercises (Hurley, Patterson, & Cooley, 2014), have better health and functioning than those who exhibit lower levels of private religiosity (Helm, Hays, Flint, Koenig, & Blazer, 2000; Koenig et al., 1998; Koenig, George, & Titus, 2004). Similarly, Jung (2017) reported that higher levels of spirituality were associated with higher positive affect among individuals who experienced childhood adversity. Conversely, Haley and colleagues reported that older adults who prayed daily or often, as well as those who rarely prayed, had higher levels of ADL impairment than participants who prayed occasionally. Because religious practices are widely utilized and a highly accessible resource for older people, more research is needed to elucidate the role that private religious practices have in mitigating the influence of life stressors on health outcomes.

In accordance with Pearlin's stress process, past studies suggest that life events are related to poorer mental health and this relationship might be attenuated by coping resources. Specifically, negative relational life events can increase stress responses as manifested by depressive symptoms. Private religious practices may reduce the stress of experiencing relational life events as indicated by few depressive symptoms in the year following the incidence of such events.

Research Hypotheses

Using Pearlin's stress process framework for theoretical guidance, we developed the following hypotheses predicting the associations among negative relational life events, private religious practices, and depressive symptoms (see Figure 1):

H1: The incidence of negative relational life events is positively associated with depressive symptoms.

H2: The incidence of negative relational life events is positively associated private religious practices.

H3: More private religious practices are associated with fewer depressive symptoms.

H4: Relational life events will have an indirect effect on depressive symptoms via private religious practices.

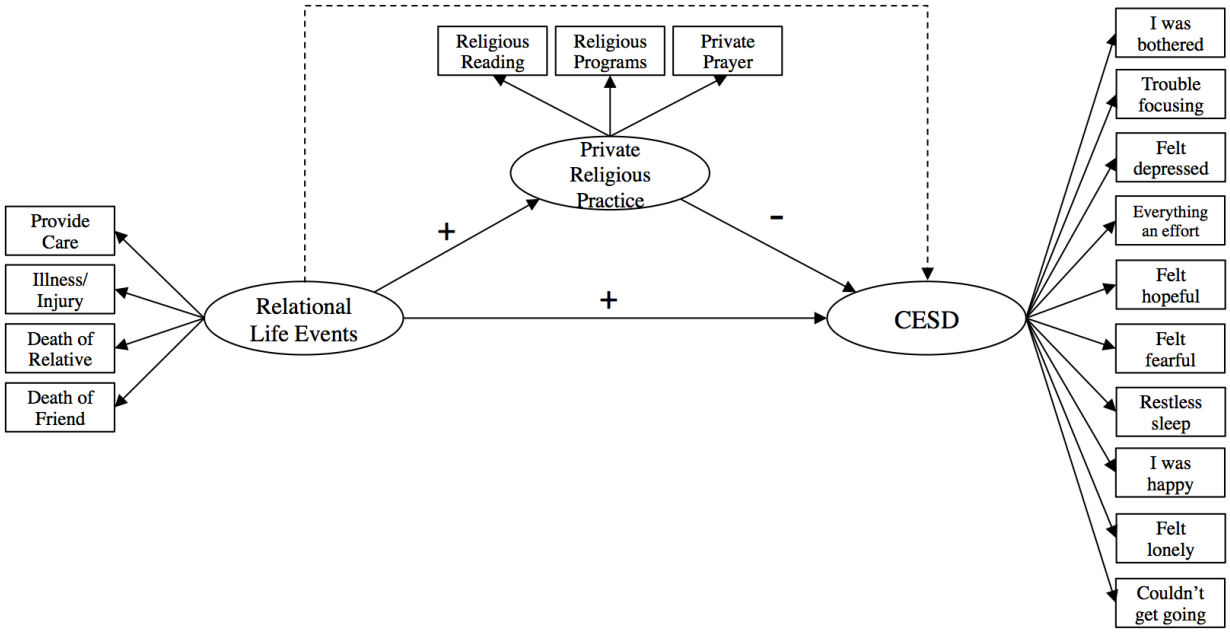

Figure 1. Hypothesized model. Dashed line indicates indirect effects.

Method

Participants

Data are from Wave 1 of the ORANJ BOWL ("Ongoing Research on Aging in New Jersey: Bettering Opportunities for Wellness in Life") research panel. The original sample consists of 5,688 adults who were recruited using telephone interviews between 2006 and 2008. Random-digit-dialing (RDD) procedures were used to recruit a sample of New Jersey residents between the ages of 50 and 74 who were able to complete a 1-hour, English-language telephone interview. Extensive details regarding RDD techniques and sample development for this study can be found elsewhere (Pruchno, Wilson-Genderson, and Cartwright, 2010).

The analytic sample for this study consisted of 5,442 participants (3,531 women) who had an average age of 60.7 years (*SD* = 7.1). Almost one-third of participants (29%) held at least a high school education, the majority of respondents were White (81%), and 12% were Black. Participants were well-dispersed throughout the state of New Jersey. We excluded 246 participants who reported that they were neither religious nor spiritual.

Measures

Life events. *Relational life events* were assessed using a dichotomous "*Yes-No*" response format for experiences within the past year (Cochrane & Robertson, 1973). We excluded items that (a) could be interpreted as positive experiences (e.g., Did you gain a new family member within the past year?) or (b) had a prevalence of less than five percent for our sample. The four items included in the model were, "Did you assume responsibility for a sick or elderly loved one?" "Did a close family member become seriously ill or injured?" "Did a close family member die?" and "Did a close friend die?"

Religious expression. Religious expression was measured using three items from the Multidimensional Measurement of Religiousness/Spirituality (MMRS; Fetzer Institute & National Institute on Aging Working Group, 1999). The three items asked participants how often they (1) read the bible or other religious literature, (2) watch or listen to religious programs on the television or radio, and (3) pray privately in places other than a church, mosque, or synagogue. All items used the following Likert scale response format: 5 = *daily*, 4 = *a few times a week*, 3 = *only once in a while*, 2 = *rarely*, 1 = *never.*

Depressive symptoms. The 10-item Center for Epidemiologic Studies Depression Scale (CES-D 10; Radloff, 1977) was used to measure frequency of *depressive symptomatology*. Respondents were provided prompts such as "I felt lonely" and "I could not get going" and asked to indicate how often they felt each way during the past week using a 4-point Likert scale (0 = *rarely or none of the time*, 1 = *some or a little of the time*, 2 = *occasionally or a moderate amount of time*, 3 = *all of the time*). Lower scores indicate lower depressive symptomatology.

Analysis

In preliminary analyses, we examined the relationships among model variables using bivariate correlations to justify structural equation model (SEM) building. Next, we used Mplus (Version 7.4; Muthén & Muthén, 2015) to conduct SEM using full information maximum likelihood estimation in a multistep model building approach to test the hypothesized model with direct and indirect (mediating) effects. First, we computed a model with only the direct effect of relational life events on depressive symptoms (Model 1[M1]). Next, we added the effects of life events on private religious practices and of private religious practices on depressive symptoms (M2). In the final model, we combined all direct pathways and computed both direct and indirect effects (Full Model). Standardized estimates are presented in the Results section.

Goodness-of-fit in the final model was assessed using multiple fit indices. First, we used chi-square to assess the magnitude of discrepancy between the sample and estimated covariance matrices (Hu & Bentler, 1999). Comparative fit indices (CFI), which range from 0 to 1 with higher scores indicating better fit, were also used. Next, the root mean square error of approximation (RMSEA) was used as an indicator of how well the estimated model fit the population covariance matrix. RMSEA values less than 0.05 indicate a close fit to the model in relation to degrees of freedom. Finally, the standardized root mean square residual (SRMR) estimates the difference between observed and predicted correlations, with smaller values less than 0.08 being better.

Results

Description of Data

The descriptive information for all manifest indicators appears in Table 1. All but one variable ("I felt fearful") fell within ranges unlikely to violate univariate normality for structural equation models (Kline, 2016). Relative Multivariate Kurtosis (RMK) was 1.178, which is below the 2.0 cutoff recommended by Jöreskog and Sörbom (1996). There were no outliers in the data. The correlation matrix for the final sample (N = 5,442) is available upon request.

Table 1. Distribution of Variables; *N* = 5,442

	n	Mean	*SD*	Skewness	Kurtosis	Min/Max
Depressive Symptoms						
I was bothered	5,430	0.491	0.691	1.541	1.240	0/3
Trouble focusing	5,436	0.606	0.804	1.244	0.342	0/3
Felt depressed	5,438	0.499	0.711	1.540	1.230	0/3
Everything an effort	5,434	0.606	0.886	1.348	0.546	0/3
Felt hopeful	5,377	0.743	1.059	1.097	-0.176	0/3
Felt fearful	5,433	0.325	0.513	2.226	4.067	0/3
Restless sleep	5,436	0.881	1.146	0.830	-0.714	0/3
I was happy	5,434	0.513	0.725	1.537	1.270	0/3
Felt lonely	5,439	0.481	0.722	1.647	1.564	0/3
Couldn't get going	5,429	0.639	0.862	1.220	0.261	0/3
Life Events						
Provide Care	5,439	0.197	0.158	1.520	0.310	0/1
Illness/Injury	5,437	0.256	0.191	1.116	-0.755	0/1
Death of Relative	5,440	0.196	0.158	1.530	0.342	0/1
Death of Friend	5,440	0.235	0.180	1.252	-0.433	0/1
Private Religious Practices						
Religious Reading	5,433	2.681	1.897	0.286	-1.123	1/5
Religious Programs	5,432	2.113	1.660	0.819	-0.551	1/5
Private Prayer	5,427	3.890	1.859	-0.895	-0.536	1/5

Note: SD = standard deviation; Min = minimum score on item; Max = maximum score on item

Omnibus Fit Indices

The full final model fit well: χ^2 (116)= 1473.088, $p < .001$, RMSEA = .046 CI [.044, .048], CFI = 0.931, and SRMR = .036. Parameter estimates for the final model are presented in Table 2; all factor loadings were significant.

Table 2. Results of nested SEM with Bootstrapped estimates (5000)

	Effects	Beta	SE	p	95% CI	R square (Dep)
M1	LE→Dep	0.211	0.021	0.000	0.170, 0.253	0.045
M2	LE→Dep	0.192	0.021	0.000	0.150, 0.234	0.048
	LE→Rel	0.151	0.022	0.000	0.108, 0.194	
	Relig→Dep	0.080	0.019	0.000	0.044, 0.116	
Full	LE→Dep	0.192	0.021	0.000	0.150, 0.234	0.048
	LE→Relig	0.151	0.022	0.000	0.108, 0.194	
	Relig→Dep	0.080	0.019	0.000	0.044, 0.116	
	LE→Relig→Dep	0.012	0.003	0.000	0.006, 0.019	

Note: LE = life events; Dep = depressive symptoms; Rel = private religious practices

Structural Equation Modeling

Results of the nested models appear in Table 2. As predicted by Hypothesis 1, the first model revealed that the incidence of negative relational life events was positively associated with depressive symptoms ($\beta = 0.21$, $p < .001$). That is, individuals who experienced more negative relational life events within the past year reported more depressive symptoms than their counterparts who experienced fewer of these life events.

The second model introduced private religious practices (H2-H3). The results showed that greater incidence of the relational life events was positively associated with private religious practices ($\beta = 0.151$, $p < .001$) such that individual who reported a greater number of relational life events also reported greater private religious practices. Conversely, private religious practices were positively associated with depressive symptoms ($\beta = 0.08$, $p < .001$), which contrasts H3. This model, displayed as M2 in Table 2, also revealed that the direct relationship between relational life events and depressive symptoms was reduced after the inclusion of private religious practices ($\beta = 0.19$, $p < .001$), although it did not lose significance. The full final model presented in Figure 2 revealed a small but significant indirect effect from relational life events to depressive symptoms via private religious practices ($\beta = 0.012$, $p < .001$).

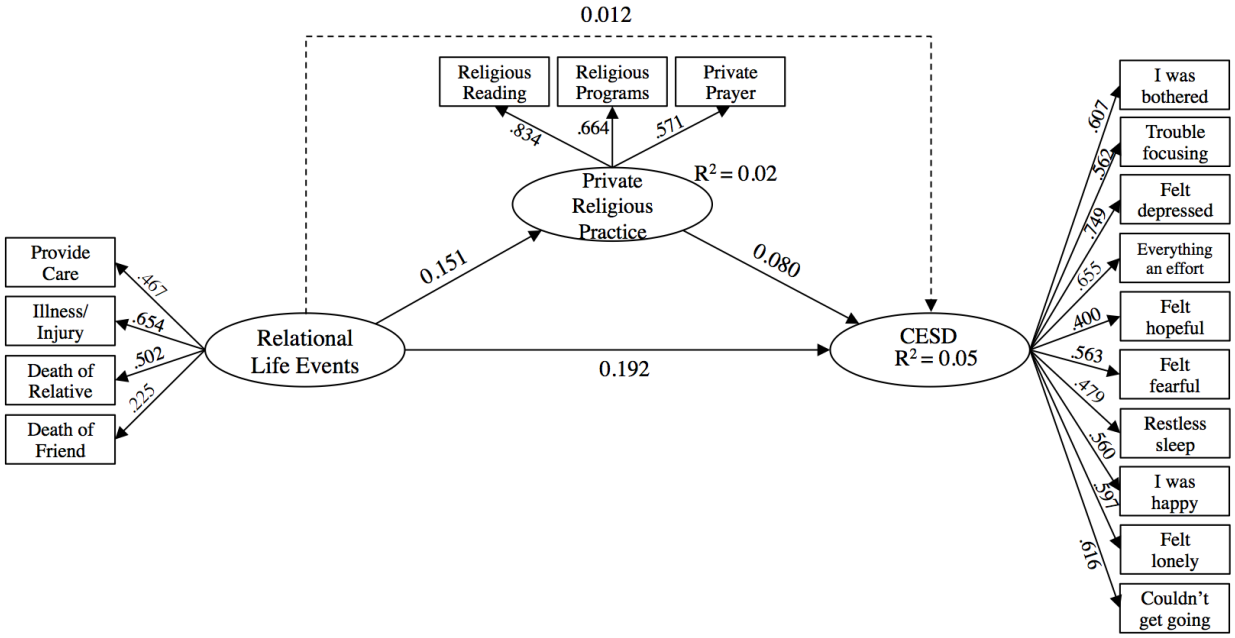

Figure 2. Final full model with standardized factor loadings and path coefficients; all estimates in the model are significant at <.001. . RMSEA = .046 (90% CI .044, .048), CFI = 0.931, and SRMR = .036.

Discussion

The goal of this study was to investigate the association of certain relational life events with depressive symptoms and to explore the mediating effects of private religious practices on this association. We specifically focused on the contribution of stressful relational life events to depressed mood in adults over 50 because these relational life events are common in middle age, and tend to occur in tandem. The results showed that experiencing more negative relational life events was associated with more depressive symptoms. This focus on relational life events that reflect the influence of a relative or loved one's well-being on one's psychological health is grounded in research on family and friend relationships. Previous studies demonstrated that health changes in a loved one are closely tied to one's own psychological distress (Blieszner &

Roberto, 2009; Polenick, Renn, & Birditt, 2018), consonant with Elder's (1998) notion of linked lives.

The results confirmed the first hypothesis that the accumulation of life events affecting loved ones is associated with more depressive symptoms. The accumulation of relational life events likely accompanies a trajectory of functional decline in loved ones, which begins with onset of illness and progresses to need for care and ultimately, death. These relational events are more likely to be experienced by middle-aged and older adults than by younger adults because people tend to spend the majority of their time with individuals who are similarly-aged or older. In addition to their roles in caring for others, middle and older age adults are likely to be experiencing changes in their own health and functioning (Violan et al., 2014) which may exacerbate the stress of caring for others. Similarly, while past life event research typically focused on personal health and wellness as the focal event, the current results demonstrate that changes in a relative or loved one's health has a measurable impact on one's own mental health. A novel aspect of the present study is that participants recalled these relational life events up to one year after they occurred, thereby illustrating that such events remain salient and should be considered when assessing health risks in older people.

Participants who experienced more negative relational life events within the past year also reported a greater number of private religious practices (H2). This finding is consistent with research suggesting that the propensity to cope using religion is particularly strong for individuals facing health decline, illness, and death of a loved one (Jenkins & Pargament, 1995; Pargament & Hahn, 1986; Siegel, Anderman, & Scrimshaw, 2001). By extension, adults who experience negative relational life events may turn to private religious expression via prayer and reading religious texts (Blieszner & Roberto, 2009). From a stress process perspective, stressful

life events necessitate a coping response (Pearlin et al., 1981). Because religious expression is common among many older people, it is not surprising that relational life events are associated with greater religious coping.

The results also showed that private religious expression was associated with more depressive symptoms. Similar results were found by Winter, Moriarty, Atte, and Gitlin (2015) who reported that that among caregivers of individuals with dementia, private religious practices (e.g., frequency of prayer) were associated with greater depressed mood while public religious practices (e.g., religious service attendance) were associated with less depressed mood.

Another explanation for positive association between depressive symptoms and private religious practices may be that participants who are more depressed to begin with are utilizing internal religious coping. Indeed, the present cross-sectional results suggest that life events coupled with more depressive symptoms led to coping via private practices, which is consistent with Ferraro and Kelley-Moore's (2000) religious consolation phenomenon. In a study of 3,617 adults from the Americans' Changing Lives survey, Ferraro and Kelley-Moore found that health-related stressors were associated with an increase in private religious-seeking behaviors over time. Our results extend Ferraro and Kelley-Moore's notion of religious consolation by suggesting that not only one's own health problems, but health problems in a relative or loved one, are important motivators for religious-seeking behaviors.

Finally, while we did find a significant indirect effect from relational life events to depressive symptoms via private religious practices, the effect was small. Given that the latent constructs were strong enough to establish significant direct effects, it is possible that additional manifest indicators are needed to better approximate public and private religious expression as mediators in this model. For example, previous research suggests that problem-focused coping

and cognitive reappraisal (Folkman & Lazarus, 1988) within the scope of religious belief (Krägeloh, Chai, Shepherd, & Billington, 2012) are associated with lower stress and positive well-being. Assessment of these influences might improve the mediation model, so indicators that assess forms of coping within private religious practices should be included in future studies.

Future Research

We recognize that the cross-sectional analyses preclude causal inference. Future research might explore whether depressive symptoms increase (a) following the incidence and accumulation of negative relational life events and (b) after an observed change in religious expression. Although the large sample size of the first wave of the ORANJ BOWL research panel provided adequate power to explore the impact of negative relational life event on psychological well-being, additional research might further elucidate mechanisms underlying the current results, such as whether participants utilized private religious expression to begin with or in response to life stressors. Another fruitful approach would be to assess the quality of social relationships—those involving relational life events and those associated with coping—in order to better understand whether the presence or loss of these relationships is beneficial or detrimental to health. Similarly, religious coping might better be explored using measures such as the RCOPE (Pargament, Koenig, & Perez, 2000) and additional subscales from the MMRS (Fetzer Institute & National Institute on Aging Working Group, 1999) to expand the conceptualization of religious coping and improve its explanatory power in explorations of the connection between negative relational life events and psychological well-being.

Conclusion

The present study extends the literature on stress and coping by exploring relational life events, rather than focusing on the incidence of all life events, and their association with

religious practices and depressive symptoms. The results showed that the experience of negative relational life events is associated with more depressive symptoms for older adults who report more private religious expression. Using the stress process framework, we argue that the incidence of these stressful life events might cause role strains by challenging participants' ability to attend religious services, thus leading to utilization of private religious coping via solitary religious practices and more depressive symptoms. In coping with these significant life events, which can act as a barrier to public religious expression, participants might experience more depressive symptoms while also using private religious expression to help with managing stress. As such, these new findings point to the importance of understanding how quality and quantity of life events might elicit distress in older adults.

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MANUSCRIPT II:

Health burden, instrumental and emotional support adequacy, and depressive symptoms in older men with HIV

IRB approval #: 17-552

Abstract

Background and Objectives: Older adults with HIV face greater health burden than HIV-uninfected counterparts. Little is known about resources that might mediate the influence of physiological health burden on psychological well-being. Using the stress process model, we assessed the influence of multifaceted health burden indicators on depressive symptoms and evaluated the mediating effects of social support adequacy.

Research Design and Methods: This cross-sectional study employed structural equation modeling with data from 640 older men who participated in the Research on Older Adults with HIV study. Health burden assessment included number of age-related chronic conditions, multiple HIV-related chronic conditions, and self-rated health. Perceptions of instrumental and emotional support adequacy were used to measure support as a coping resource. Depressed mood as measured by the CES-D 10 was the measure of psychological well-being.

Results: Higher incidence of age-related conditions and worse self-rated health were significantly associated with more depressed mood. Self-rated health and HIV-related conditions showed a significant indirect effect on depressed mood via emotional support adequacy.

Discussion and Implications: Each dimension of health burden had a differential effect on psychological well-being for people with HIV, which should be considered when prioritizing care plans. In contrast to research on medical interventions for people with HIV, these findings suggest that nonpharmacologic interventions are important for improving overall well-being.

Introduction

Older adults with HIV are a growing group at risk for greater health burden than their HIV-uninfected counterparts (Guaraldi et al., 2011). In 2014, approximately 45% of Americans living with HIV were aged 50 years and older (CDC, 2018); this number is estimated to increase to 70% by 2020 (Karpiak & Lunievicz, 2017). These adults are challenged with navigating HIV care in conjunction with managing common age-related chronic conditions (Nakagawa, May, & Phillips, 2013; Roberson, 2018), which have a higher prevalence in older people with HIV (Guaraldi et al., 2011). Although HIV treatment has progressed, the experience of aging with HIV is obscure and the role of support mechanisms in living with HIV is understudied. The goals of the present study are to (a) assess health burden using three dimensions of health and its relation to depressed mood for men aging with HIV and (b) determine whether this relationship is mediated by instrumental and emotional support adequacy.

Health Burden

A large literature documents the increased disease burden experienced by people over 50 years of age with HIV (High et al., 2012). Multimorbidity is commonly defined as the coexistence of two or more chronic conditions and, not including HIV status, has a prevalence ranging from 65% (Kim et al., 2012) to 77% (Brennan, Karpiak, Cantor, & Shippy, 2009) in this group. For these adults, multimorbidity is associated with greater levels of stress, poorer physical and social function (Balderson et al., 2013), and greater frailty (Pathai et al., 2014). Comorbidities that increase with age are more common among people with HIV at every age (Pathai, Bajillan, Landay, & High, 2014) and include arthritis, diabetes, heart condition, hypertension, and respiratory problems.

Similarly, HIV is accompanied by an array of other health conditions, including broken bones, dermatological problems, neuropathy, and hepatitis (High et al., 2012). While disease- and age-related conditions can be managed with medication and ongoing care, older adults with HIV are challenged to navigate and integrate complex pharmacologic treatment regimens that are often costly and can present an additional dimension of burden. At the same time that they are challenged with severe chronicity, adults with HIV may experience barriers to formal and informal resources due to stigma and minority status; these barriers lead to "blocked" access to coping resources and constrained opportunity structures (Avison, Aneshensel, Schieman, & Wheaton, 2010). Indeed, older people with HIV report fewer social supports (Grov, Golub, Parsons, Brennan, & Karpiak, 2010; Smith, Rossetto, & Peterson, 2008), worse health (High et al., 2012), and stigma as a barrier to care (Stringer et al., 2016) compared to other aging persons. Given the complicated medication plan these persons are maintaining, psychosocial resources are one possibility for improving health without adding to the burden of health management.

Research on psychological and subjective measures of health also documents additional age- and disease-related challenges for older adults with HIV. For example, depression has prevalence two (Slot et al., 2015) to three times (Grov, Golub, Parsons, Brennan, & Karpiak, 2010; Kessler et al., 2008) higher in older adults with HIV than in the general population, which is related to multimorbidity (High et al., 2012) and lack of social resources (Greene et al., 2017; Scrimshaw & Siegel, 2003). Research demonstrates that physiological stressors are associated with increases in depressive symptoms over time (Karakus & Patton, 2011). Similarly, self-rated health, a global measure of one's own evaluation of health, is a strong predictor of morbidity (Rutledge et al., 2010), mortality (Jylhä, 2009), and cognitive decline (Bendayan, Piccinin, Hofer, & Muniz, 2017). Self-rated health is useful in capturing dimensions of health and function

that may otherwise be overlooked by standard clinical assessments (Bjorner, Fayers, & Idler, 2005; Jylhä, 2009).

While various dimensions of health (e.g., chronic conditions, HIV-related conditions, and self-rated health) are all important determinants of psychological health in older people with HIV, little research has combined them into a multidimensional indicator that better reflects the cumulative burden of aging with HIV. Several studies evaluated the relationship between number of comorbidities and outcomes of psychological health (Balderson et al., 2013; Havlik, Brennan, and Karpiak, 2011; Millar, Starks, Gurung, & Parsons, 2017) but this work subsumes typically age-related chronic conditions and HIV-related conditions within the same category, which reduces understanding of the contribution of different sources of stress to cumulative stress burden. Additionally, determining health burden in older people with HIV is more complex than counts of chronic conditions and should include various self-assessments of health to evaluate each dimension's unique contribution to depressed mood. To date, no research has evaluated the influence of each of these dimensions of health burden on depressive symptoms for older adults living with HIV.

Perceptions of Instrumental and Emotional Support Adequacy

Social support directly influences health-related outcomes through emotional and instrumental support (Kim & Thomas, 2017). Instrumental support refers to activities focused on physical needs such as changing bandages or helping around the house, whereas emotional support refers to activities focused on expressive needs, such as helping a friend or relative manage feelings associated with making a tough decision (Umberson, Thomeer, Kroeger, Reczek, & Donnelly, 2017). These support mechanisms are important for maintaining psychological well-being despite cognitive and physical decline. Although the majority of

research on social support focuses on the receipt of support, several studies demonstrated that the perception of support is a more important determinant of mental health than actual hours or types of support received (Chiou, Chang, Chen, & Wang, 2009; del-Pino-Casado, Frías-Osuna, Palomino-Moral, Ruzafa-Martínez, & Ramos-Morcillo, 2018; Oxman & Hull, 2001). Similarly, Oxman and Hull (2001) reported that perceptions of support adequacy were significantly related to depressive symptoms while amount of support was not, which is consistent with Chiou and colleagues' (2009) study of 301 caregivers. The receipt of instrumental and emotional support is especially important for older adults living with HIV, many of whom report high levels of HIV-related stigma (Emlet, 2006), which is negatively associated with social resources (Smith, Rossetto, & Peterson, 2008).

Pearlin's Stress Process

The conceptual framework that informs this study is Pearlin's stress process model (Pearlin, Menaghan, Lieberman, & Mullan, 1981). Three central components of the stress process model include sources of stress such as physical health burden, psychosocial coping resources that mediate stress, and outcomes of psychological health. Pearlin's model has been widely applied to gerontological health research and provides an adequate lens through which to evaluate the mediating effects of perceptions of support adequacy on the relationship between health burden and depressed mood.

The Present Study

While a number of studies have documented the relationship between overall number of chronic conditions and depressive symptoms (Havlik, Brennan, & Karpiak, 2011), none have explored the mediating relationship of instrumental and emotional support adequacy. For example, Millar and colleagues (2017) found that a greater number of comorbidities in older

adults with HIV was correlated with depressive symptoms, but did not include mechanisms that might attenuate this relationship. Like other studies, Millar and colleagues also grouped HIV-related and non-HIV-related conditions under one total count of chronic conditions. The present study builds upon these limitations by focusing on multidimensional health burden and its relationship with mediating resources, such as instrumental and emotional support adequacy, and depressive symptoms.

Hypotheses

Hypothesis 1: Greater health burden, as measured by higher incidence of (1) HIV-related conditions, (2) more non-HIV-related chronic health conditions, and (3) lower self-rated health, contributes to more depressive symptoms.

Hypothesis 2: Perceived adequacy of instrumental and emotional support mediates the relationship between various dimensions of health burden and depressive symptoms.

The hypothesized model is presented in Figure 1.

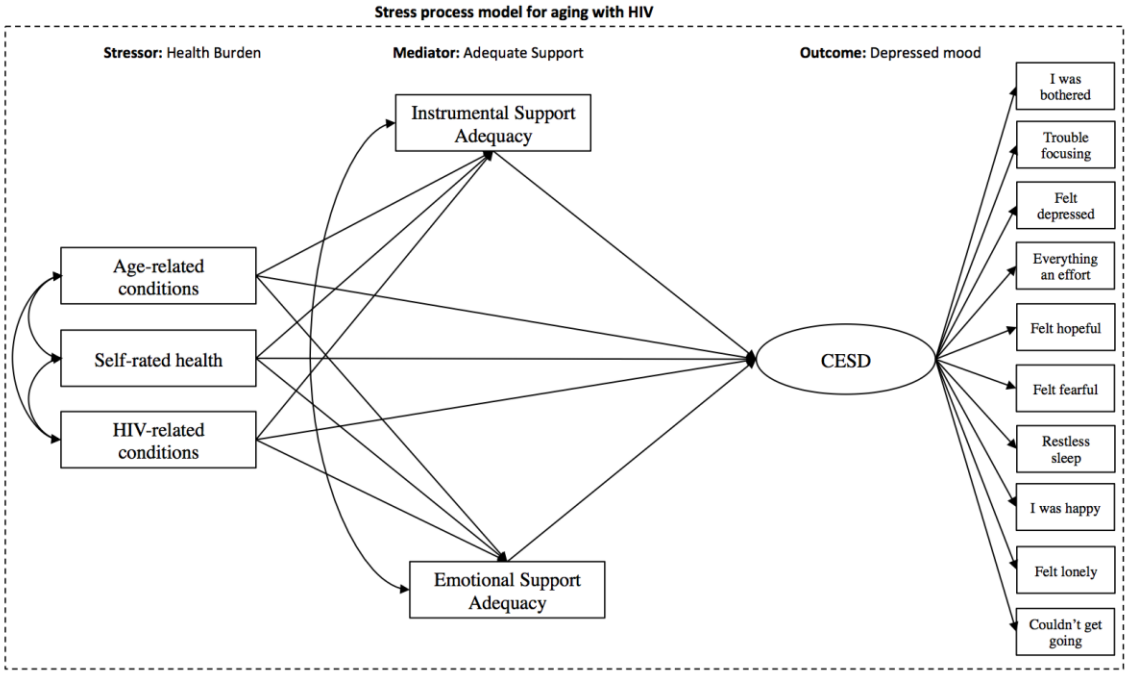

Figure 1. Hypothesized model for the relations among health burden, support adequacy, and depressed mood.

Method

Participants

The data for this study come from the AIDS Community Research Initiative of America (ACRIA)'s Research on Older Adults with HIV (ROAH) project. This cross-sectional sample includes 914 adults with HIV over the age of 50 who were recruited from New York City-based AIDS service organizations, hospitals, and ACRIA's database in 2005. Inclusion criteria were English language proficiency, HIV-positive diagnosis, age 50 years or older, community-dwelling, and being male. The final sample for this study included 640 men who were aged 50-78 and who had HIV for an average of 13 years. Non-Hispanic blacks comprised the majority of the sample, followed by Hispanic and then non-Hispanic whites. Most participants identified as heterosexual, while the others were gay or bisexual. Full demographic information for the sample is presented in Table 1.

Table 1. Characteristics of Male ROAH participants; $N = 640$

Participant Characteristics	*N*	%	Mean	*SD*
Age (50-78)	638		55.69	4.98
Length of HIV diag (mos)	629		157.35	63.13
Race/ethnicity				
Non-Hispanic white	102	16.7		
Non-Hispanic black	302	49.5		
Hispanic	206	33.8		
Sexual orientation				
Heterosexual	364	59.6		
Gay/bisexual	247	40.4		
Education				
<High school grad	110	17.2		
High school grad	177	27.6		
Some college	162	25.3		
College grad	95	14.8		
Graduate school	66	10.3		
Vocational/other	30	4.7		
Employment				
Working	52	8.1		
Retired	48	7.5		
Unemployed	128	20.0		
On disability	345	53.9		
Volunteer	19	2.9		
Other	48	7.5		

Measures

Health conditions: HIV- and age-related chronic. ROAH collected self-report comorbidity data for 16 health conditions by asking participants, "Have you experienced any of the following health problems in the last year?" We grouped conditions based on whether they were related to an HIV diagnosis or typical chronic health conditions. Only conditions with a prevalence greater than 5% were included in the analyses. HIV-related conditions consisted of broken bones, dermatological/skin problems, neuropathy, hepatitis, and AIDS diagnosis, which are illnesses frequently reported by people who are HIV-positive. Chronic conditions were arthritis, diabetes, heart condition, hypertension, and respiratory problems. These chronic conditions are among the most prevalent in US adults (Ward, Schiller, & Goodman, 2012),

reflect various dimensions of physiologic functioning, and are related to depression and psychological well-being (Pruchno, Wilson-Genderson, & Heid, 2016).

Self-rated health. The measure of participants' perceptions of their physical function was the following question: "How would you rate your physical health at this time?" Participants answered using a response scale that ranged from 0 (*worst possible health*) to 10 (*best possible health*).

Support adequacy. Support adequacy reflects perceptions of unmet need based on instrumental and emotional support. To assess adequacy of instrumental support, participants were asked, "During the past year, how much more help did you need with [activities such as shopping, house cleaning, cooking, getting a ride somewhere]?" For emotional support, participants were asked, "During the past year, how much more emotional support [such as having someone to talk to or help make a big decision] did you need?" Participants responded using a 4-point Likert scale Items were reverse coded so that higher scores indicated more support adequacy and less unmet need. (4 = *I got all I needed*, 3 = *A little more*, 2 = *Some more*, 1 = *A lot more*).

Depressive symptoms. The 10-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) assessed depressed mood. Respondents responded to prompts such as "I felt sad" and "I could not get going" by indicating how often they had felt that way during the past week using a 4-point Likert scale (0 = *None of the time*, 1 = *A little of the time*, 2 = *Some of the time*, 3 = *Most of the time*). Higher scores indicate more depressive symptoms. Cronbach's alpha for the CES-D was .82, indicating good reliability.

Descriptive statistics for the study variables appear in Table 2.

Table 2. Descriptive statistics for model variables; $N = 640$

Variables (range)	*N*	%	Mean	*SD*
HIV-related conditions (0-5)	628		1.43	1.21
Broken bones (0/1)		8		
Dermatological/skin (0/1)		20		
Neuropathy (0/1)		29		
Hepatitis (0/1)		31		
AIDS diagnosis (0/1)		54		
Self-rated health (0-10)	620		6.75	3.10
Chronic conditions (0-5)	639		0.83	0.82
Arthritis (0/1)		27		
Diabetes (0/1)		13		
Heart condition (0/1)		9		
Hypertension (0/1)		24		
Respiratory (0/1)		10		
Support adequacy				
ADL support (1-4)	618		3.05	1.00
Emotional support (1-4)	627		2.75	1.09
Depressive symptoms (0-30)	637		20.27	11.72

Analytic Strategy

We used Stata (v.14.2) to calculate descriptive statistics and examine bivariate correlations among latent variables to justify building a structural equation model (SEM) in Mplus (v.7.4; Muthén & Muthén, 2015). Next, we used Mplus to evaluate skewness and kurtosis; all variables fell within ranges unlikely to violate multivariate normality (Kline, 2004) and thus were appropriate for SEM. Full information maximum likelihood estimation was used to estimate missing data and test direct and indirect effects.

Following Baron and Kenny's (1986) conditions for mediation, we first calculated the direct relationships between the independent (HIV-related conditions, chronic conditions, and self-rated health) and dependent (depressive symptoms) variables. Next, we added instrumental and emotional support adequacy as mediators to assess direct effects between support adequacy and both independent and dependent variables. The final model included all direct pathways among variables and tested indirect effects of health variables on depressive symptoms via

instrumental and emotional support adequacy. Model fit was evaluated using the following typical indices and recommended cutoffs (Hu & Bentler, 1999): root-mean square error of approximation (RMSEA; <.06), comparative fit index (CFI; >.95), and standardized root-mean square residual (SRMR; <.05).

Results

Model fit information revealed goodness of fit in the final model: χ^2 (80)= 151.45, p < .001, RMSEA = .037 CI (.028, .046), CFI = 0.958, and SRMR = .033. All factor loadings were significant (<.001) and are presented in the final model in Figure 2.

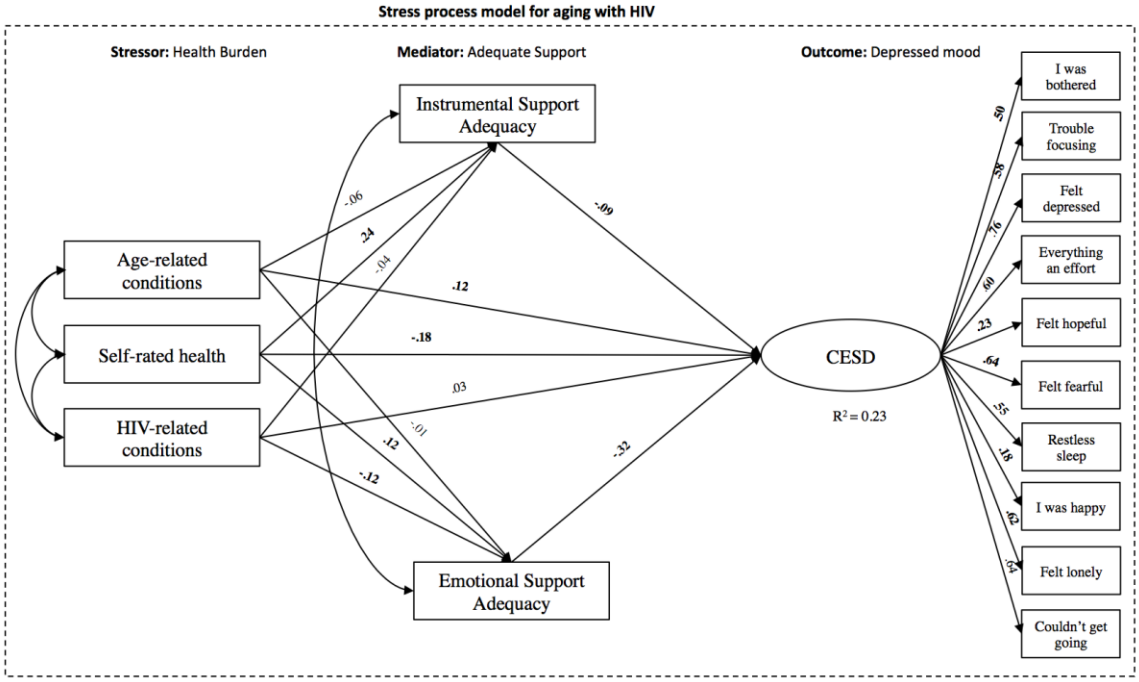

Figure 2. Final full model with standardized factor loadings and path coefficients. RMSEA = .037 (90% CI .028, .046), CFI = 0.958, and SRMR = .033; ****p*<.001

Structural Equation Modeling

The first model tested Hypothesis 1, which investigated the direct effects of the independent variables on the dependent variable. Consistent with this hypothesis, we found two of the three dimensions of health burden were associated with more depressive symptoms.

Specifically, the results showed that more age-related chronic conditions (β = 0.12, $p < .01$) and poorer self-rated health (β = -0.18, $p < .001$), but not HIV-related conditions (β = 0.03, $p = .441$), predicted more depressive symptoms.

The second model introduced instrumental and emotional support adequacy to establish direct relationships between the independent variables and the mediators, and the mediators and the dependent variable. The results revealed that self-rated health was the only predictor significantly related to instrumental support adequacy (β = 0.24, $p < .001$), indicating that better self-rated health was associated with more adequate instrumental support. HIV-related conditions (β = -0.12, $p < .01$) and self-rated health (β = 0.12, $p < .01$) were both significantly associated with emotional support adequacy. That is, participants who reported a greater number of HIV-related conditions and poorer self-rated health also reported that they needed more emotional support than they received.

We also found that instrumental (β = -0.09, $p < .05$) and emotional (β = -0.32, $p < .001$) support adequacy were both significantly related to depressive symptoms, indicating that adequate emotional and instrumental support are associated with less depressed mood. Because the mediators were significantly associated with the independent and dependent variables, we conducted a final model that tested mediation effects.

The final model revealed that emotional support adequacy, but not instrumental support adequacy, significantly mediated the associations between two out of three dimensions of health burden and depressive symptoms, which partially supports Hypothesis 2. Specifically, the final model showed indirect effects from HIV-related conditions (β = 0.038, $p < .01$) and self-rated health (β = -0.04, $p < .01$) to depressed mood via emotional support adequacy. This model

revealed partial mediation of the relationship between overall health burden (excluding chronic conditions) and depressive symptoms via emotional support adequacy.

Discussion

With a growing proportion of older adults with HIV in the United States, the need to better understand the cumulative impact of physical health burden on psychological well-being is urgent. Identifying specific pathways from objective (e.g., HIV- and age-related conditions) and subjective (e.g., self-rated health) health to psychological well-being can provide insight into developing targeted interventions that reduce acute care utilization while maximizing adherence to patient preferences. Similarly, exploring nonpharmacologic interventions can improve psychological health without adding to the burden of complex treatment regimens, which are commonly reported by people with HIV (High et al., 2012).

The results of these analyses suggest that improving social support can mitigate the association between subjective and objective health burden and depressed mood. This finding informs the importance of social support in enhancing the well-being of people living with HIV. Most research on interventions in people with HIV has focused on ensuring treatment adherence, but fewer studies have emphasized improving social support as a means to improved overall health and wellness. One study (Tam et al., 2012) focused on a sample of 119 people living in Vietnam, approximately 74% of whom were younger than 35 years of age. The results showed that, in comparison to a control group, participants who received a peer support intervention

reported better psychological well-being. However, Tam and colleagues' (2012) study did not explore perceptions of social support and whether the intervention improved perceptions of support adequacy, nor did they focus on tailored interventions that addressed specific instrumental and emotional needs. Further, in a meta analysis of psychosocial interventions for people living with HIV, van Luenen et al. (2018) reported that 20 out of 72 studies focused on social support, but only two of these studies included a sample with an average age of 50 or older. Together, the results of the present study indicate that improving perceptions of social support, and thus reducing unmet social need, can reduce disease burden; this area of research in people over 50 is understudied and deserves further investigation.

To our knowledge, this study is among the first to conceptualize cumulative health burden in adults age 50 and older with HIV using a multidimensional indicator that encompasses a subjective assessment of health and separate measures of age-related and HIV-related chronic conditions. This approach is important because it highlights the necessity of assessing factors that influence the daily experience of living with HIV in the second half of life. Each dimension of health burden in this study was differentially associated with depressive symptoms. For example, health burden was indirectly associated with depressive symptoms via emotional support adequacy for self-rated health and HIV-related conditions but not age-related conditions. Understanding which dimensions of health predict well-being informs prioritized, targeted care planning. The present findings indicate that social interventions may be useful in mitigating the

impact of cumulative health burden on depressed mood, thereby reducing the likelihood of subsequent frailty (Buigues et al., 2015). .

Various dimensions of health burden can have differing influences on psychological health in people living with HIV. Notably, age-related chronic conditions showed only a significant direct relationship to depressive symptoms whereas HIV-related conditions showed only a significant indirect relationship to depressive symptoms via emotional support adequacy. This finding extends past research on multimorbidity in older adults with HIV and suggests that future studies should differentiate between conditions related to chronological age and conditions related to a diagnosis of HIV. Such a differentiation has important implications for care planning

A potential limitation of the study is that ROAH participants were recruited from AIDS service organizations, health clinics, and community events. Thus, they were already accessing services and may be in better health than those who were not accessing health services. Additionally, the measurement of chronic conditions in this study varied from past research; we did not include conditions such as stroke, cancer, hearing loss, and vision loss, which have been included in studies focusing on numbers of chronic conditions in older adults living with HIV (Havlik, Brennan, & Karpiak, 2011; Millar et al., 2017). Instead, we focused on the most common HIV-related comorbidities and typical age-related non-HIV conditions and measured them individually rather than as one sum count of HIV-related and non-HIV conditions. This

difference may be responsible for the lower number of total chronic conditions when compared to other studies (Havlik, Brennan, & Karpiak, 2011; Millar et al., 2017).

Practice and Policy Implications

Findings from this study highlight the importance of social-based interventions that target emotional and instrumental support to mitigate the cumulative effects of health burden on psychological well-being. An example of such programs includes adult day health (ADH) centers, which provide daytime social programming that is typically paired with medical supervision (Jarrott & Ogletree, 2016). ADH programs can improve health outcomes via mechanisms of instrumental and emotional support (Schmitt, Sands, Weiss, Dowling, & Covinsky, 2010), but we were unable to find research that explored ADH participation among people with HIV. A number of barriers may prevent ADH utilization, including fear of stigma and discrimination, cost, and lack of education about ADH programs. Further, older adults with HIV may just now be meeting criteria for inclusion in ADH settings, which includes cognitive and physical frailty and advanced age. Nonetheless, programs such as ADH will become increasingly important as a larger portion of people with HIV advance into old age and as health researchers continue exploring resources that reduce acute care utilization.

Aside from the possibility of ADH programs, services that target social wellness for people with HIV are scarce. Available programs are typically advertised through organizations such as SAGE (Advocacy and Services for LGBT Elders), which target adults from sexual

minority groups. While invaluable as sources of disseminating information about available services, these resources are unlikely to be utilized by non-LGBT elders. For example, almost 60% of the ROAH sample members reported heterosexuality, and this group does not include transgender participants. Indeed, the historical assumption is that HIV only affects LGBT people; yet the composition of this study's sample indicates that HIV services should be advertised to both heterosexual and LGBT adults.

Another consideration for clinicians and policymakers is the paucity of HIV services for older people in non-urban settings. In previous years, people with HIV have been located predominantly in large cities such as New York, San Francisco, and Atlanta. Although services for people with HIV in these areas have flourished, the same access to services is not available for people in rural areas (Quinn, Sanders, & Petroll, 2017). Epidemiological maps of people with HIV show widespread distribution across both urban and rural settings. In fact, the proportion of people with HIV is the same in rural and urban settings (National Rural Health Association, 2014). Findings from the ROAH study show that approximately 36% of all participants (n = 324) contracted HIV through needle sharing. Especially within the context of the growing opioid epidemic in rural areas of the United States and the increasing age of people who are both living with and contracting HIV (CDC, 2015), access to specialized services is a dire need. Rural older adults with HIV tend to seek care later than their urban counterparts, which translates into more

advanced HIV infection (Ohl et al., 2010), an increased risk for greater health burden, and costlier care.

Limitations

Research on older adults with HIV lags behind that on younger persons with HIV and non-HIV-infected older adults. The ROAH sample is limited in a number of ways, including the cross-sectional design, nonprobability sampling, and focus on New York City residents. Nonetheless, the ROAH sample is among the few data sources that adequately capture intricacies of aging with HIV. Future work might use probability sampling techniques to recruit older adults with HIV in urban and rural settings. Similarly, the use of existing data, while helpful in providing a large number of difficult-to-reach participants, limits research questions to those variables already included in the original study.

Conclusion

This study extends the literature on aging with HIV by examining multidimensional, cumulative health burden and its relationship to psychological well-being, and testing whether this relationship is mediated by unmet social need as measured by perceptions of support adequacy. Findings highlight the complexity of living with the health burden of HIV while also pointing to the importance of understanding the day-to-day manifestation of health burden as measured by depressed mood. A critical next step is to evaluate the extent to which integrated care services for older adults with HIV are addressing multiple intersecting dimensions of health—those related to HIV, to aging, and to psychosocial well-being.

The mediation analyses in this study identified social support as a crucial component of the stress process for people with HIV and measure of unmet need. The majority of intervention research for people with HIV focuses on treatment adherence but overlooks social support

interventions. Such interventions may be a viable nonpharmacologic approach to improving health in people who are navigating complex pharmacologic treatment regimens. Further, mitigating the effects of cumulative health burden on depressed mood may slow chronic disease progression such that those with HIV and perceived social support adequacy experience fewer early-onset comorbidities.

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CONCLUSIONS

The studies described in this dissertation used Pearlin's stress process model (1981) as the orienting framework for understanding how health- and social-related stressors unfold across the life course. Indeed, people over the age of 50 are more likely than their younger counterparts to experience changes in social networks (Antonucci & Akiyama, 1987), onset of chronic conditions (Salive, 2013), and overall declines in health and functioning (American Geriatrics Society, 2012). Research that focuses on risk and resilience factors is crucial for improving quality of life for the almost 90 million people who will age past 65 in the coming decades (Vincent & Velkoff, 2010).

Notable findings from these studies advance research on health and aging. First, relational life events significantly impact depressive symptoms, which warrants further exploration. Traditional life events research focuses on personal life events but, according to Elder's notion of linked lives (Elder, 1994), scholars know that aging occurs in tandem with members of one's social network. As such, it is important to understand the influence of negative events in a family or friend's life, and how that influence might impact one's own health and happiness. Further, this study revealed that life events were related to more private religious practices and more depressive symptoms, which suggests that those who utilize private religious practices may be doing so in response to serious life stressors. Future research is needed to improve recognition and treatment for depressive symptoms associated with relational life events.

The second study revealed that unmet social need among men with HIV is related to greater health burden and more depressed mood. A vast literature shows that having HIV is related to loneliness (Greene et al., 2017), isolation (Scrimshaw & Siegel, 2003), and stigma

(Grov et al., 2010), which may all impact perceptions of social support. With the rising number of older adults living with HIV, it is imperative to provide both medical and social supports that target all dimensions of wellness and mitigate the relationship between health burden and daily experiences of living with HIV. More research is needed that focuses on rural older adults with HIV, who face greater geographic, social, and cultural barriers than their urban-dwelling counterparts.

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APPENDIX A: Manuscript I IRB Approval

Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120, Virginia Tech
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website http://www.irb.vt.edu

MEMORANDUM

DATE: September 5, 2017

TO: Laura Prouty Sands, Aaron Michael Ogletree, Rosemary Blieszner, Tina Savla

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)

PROTOCOL TITLE: Health Outcomes from Older Adults in the ORANJ BOWL Dataset

IRB NUMBER: **15-881**

Effective September 1, 2017, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the Continuing Review request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

http://www.irb.vt.edu/pages/responsibilities.htm

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As:	**Expedited, under 45 CFR 46.110 category(ies) 5**
Protocol Approval Date:	**September 24, 2017**
Protocol Expiration Date:	**September 23, 2018**
Continuing Review Due Date*:	**September 9, 2018**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

APPENDIX B: Manuscript I Final Model Output

```
Mplus VERSION 8 (Mac)
MUTHEN & MUTHEN
03/02/2018   2:08 PM

INPUT INSTRUCTIONS

  TITLE:            This is a test run with new sample for dissertation;
  DATA:             FILE IS Macintosh HD/Users/aaronogletree/Desktop/Manuscripts/
             OB Man 1 JGSS/JGSS dissertation 030218.dat;
  VARIABLE:         NAMES ARE F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 G5 G11 G12 G13
             R1 R2 R3 R4 R5 R6;
             MISSING ARE ALL (999);
             USEVARIABLES ARE F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 G5 G11
             G12 G13 R3 R4 R5;
  ANALYSIS:  BOOTSTRAP IS 5000;
  MODEL:            Y BY F1 F2 F3 F4 F5 F6 F7 F8 F9 F10;
             X BY G5 G11 G12 G13;
             REL BY R3 R4 R5;
             !PUB BY R2_R R6_R;
             !PRI BY R1_R R3_R R4_R R5_R;
             Y ON REL;
             Y ON X;
             REL ON X;
  MODEL INDIRECT:   Y IND X;
             !Y IND PRI X;
  !MODEL CONSTRAINT:
             !NEW (LOW_W MED_W HIGH_W
             !IND_LOWW IND_MEDW IND_HIW
             !TOT_LOWW TOT_MEDW TOT_HIW);
             !LOW_W = -3.419;
             !MED_W = 0;
             !HIGH_W = 3.419;
             !IND_LOWW = a1*b1 + a1*b4*LOW_W;
             !IND_MEDW = a1*b1 + a1*b4*MED_W;
             !IND_HIW = a1*b1 + a1*b4*HIGH_W;
             !TOT_LOWW = IND_LOWW + cdash;
             !TOT_MEDW = IND_MEDW + cdash;
             !TOT_HIW = IND_HIW + cdash;
  OUTPUT:           CINTERVAL (BOOTSTRAP);
             SAMPSTAT;
             STDYX;
             STD;



INPUT READING TERMINATED NORMALLY



This is a test run with new sample for dissertation;

SUMMARY OF ANALYSIS

Number of groups                                                 1
Number of observations                                        5442

Number of dependent variables                                   17
Number of independent variables                                  0
```

Number of continuous latent variables 3

Observed dependent variables

Continuous
F1 F2 F3 F4 F5 F6
F7 F8 F9 F10 G5 G11
G12 G13 R3 R4 R5

Continuous latent variables
Y X REL

Estimator	ML
Information matrix	OBSERVED
Maximum number of iterations	1000
Convergence criterion	0.500D-04
Maximum number of steepest descent iterations	20
Maximum number of iterations for H1	2000
Convergence criterion for H1	0.100D-03
Number of bootstrap draws	
Requested	5000
Completed	5000

Input data file(s)
Macintosh HD/Users/aaronogletree/Desktop/Manuscripts/ OB Man 1 JGSS/JGSS disse

Input data format FREE

SUMMARY OF DATA

Number of missing data patterns 36

COVARIANCE COVERAGE OF DATA

Minimum covariance coverage value 0.100

PROPORTION OF DATA PRESENT

Covariance Coverage

	F1	F2	F3	F4	F5
F1	0.998				
F2	0.997	0.999			
F3	0.997	0.998	0.999		
F4	0.997	0.998	0.998	0.999	
F5	0.986	0.987	0.988	0.987	0.988
F6	0.996	0.998	0.998	0.997	0.987
F7	0.997	0.998	0.998	0.998	0.987
F8	0.997	0.998	0.998	0.997	0.987
F9	0.997	0.999	0.999	0.998	0.988
F10	0.996	0.997	0.997	0.997	0.986
G5	0.997	0.998	0.999	0.998	0.988
G11	0.997	0.998	0.998	0.998	0.987
G12	0.997	0.999	0.999	0.998	0.988
G13	0.997	0.999	0.999	0.998	0.988
R3	0.996	0.997	0.998	0.997	0.986
R4	0.996	0.997	0.997	0.997	0.986
R5	0.995	0.996	0.997	0.996	0.985

Covariance Coverage

	F6	F7	F8	F9	F10
F6	0.998				
F7	0.997	0.999			
F8	0.997	0.997	0.999		
F9	0.998	0.998	0.998	0.999	
F10	0.996	0.997	0.996	0.997	0.998
G5	0.998	0.998	0.998	0.999	0.997
G11	0.997	0.998	0.998	0.999	0.997
G12	0.998	0.999	0.998	0.999	0.997
G13	0.998	0.999	0.998	0.999	0.997
R3	0.997	0.997	0.997	0.998	0.996
R4	0.997	0.997	0.997	0.998	0.996
R5	0.996	0.996	0.996	0.997	0.995

Covariance Coverage

	G5	G11	G12	G13	R3
G5	0.999				
G11	0.999	0.999			
G12	0.999	0.999	1.000		
G13	0.999	0.999	0.999	1.000	
R3	0.998	0.997	0.998	0.998	0.998
R4	0.998	0.997	0.998	0.998	0.997
R5	0.997	0.996	0.997	0.997	0.997

Covariance Coverage

	R4	R5
R4	0.998	
R5	0.997	0.997

SAMPLE STATISTICS

ESTIMATED SAMPLE STATISTICS

Means

F1	F2	F3	F4	F5
0.492	0.607	0.499	0.606	0.743

Means

F6	F7	F8	F9	F10
0.326	0.881	0.513	0.481	0.639

Means

G5	G11	G12	G13	R3
0.197	0.257	0.196	0.235	2.681

Means

	R4	R5
	2.114	3.889

Covariances

	F1	F2	F3	F4	F5
F1	0.691				
F2	0.284	0.805			
F3	0.317	0.307	0.711		
F4	0.307	0.328	0.362	0.886	
F5	0.184	0.154	0.265	0.239	1.059
F6	0.236	0.208	0.262	0.243	0.141
F7	0.269	0.288	0.304	0.347	0.193
F8	0.223	0.190	0.334	0.272	0.362
F9	0.243	0.232	0.361	0.274	0.217
F10	0.266	0.326	0.335	0.447	0.207
G5	0.028	0.024	0.031	0.030	0.014
G11	0.028	0.028	0.032	0.034	0.014
G12	0.013	0.023	0.022	0.018	0.014
G13	0.029	0.020	0.021	0.017	0.011
R3	0.072	0.085	0.010	0.092	-0.080
R4	0.157	0.154	0.107	0.204	0.078
R5	0.065	0.073	0.036	0.091	-0.050

Covariances

	F6	F7	F8	F9	F10
F6	0.513				
F7	0.193	1.146			
F8	0.180	0.216	0.725		
F9	0.209	0.253	0.255	0.722	
F10	0.208	0.318	0.247	0.273	0.862
G5	0.023	0.020	0.027	0.020	0.014
G11	0.023	0.028	0.027	0.028	0.026
G12	0.018	0.018	0.023	0.031	0.010
G13	0.013	0.020	0.014	0.028	0.018
R3	0.048	-0.026	-0.053	0.053	0.046
R4	0.102	0.063	0.049	0.126	0.129
R5	0.056	0.029	-0.059	0.062	0.068

Covariances

	G5	G11	G12	G13	R3
G5	0.158				
G11	0.056	0.191			
G12	0.033	0.058	0.158		
G13	0.016	0.021	0.027	0.180	
R3	0.022	0.032	0.039	0.054	1.897
R4	0.031	0.035	0.051	0.049	0.982
R5	0.016	0.028	0.028	0.043	0.905

Covariances

	R4	R5
R4	1.660	
R5	0.641	1.858

Correlations

	F1	F2	F3	F4	F5
F1	1.000				
F2	0.381	1.000			
F3	0.453	0.406	1.000		
F4	0.392	0.388	0.456	1.000	
F5	0.215	0.167	0.305	0.246	1.000
F6	0.396	0.324	0.433	0.361	0.191
F7	0.302	0.300	0.337	0.345	0.175
F8	0.315	0.249	0.466	0.339	0.413
F9	0.344	0.304	0.504	0.342	0.249
F10	0.345	0.391	0.428	0.512	0.216
G5	0.086	0.067	0.092	0.080	0.034
G11	0.076	0.072	0.088	0.082	0.031
G12	0.039	0.065	0.064	0.048	0.034
G13	0.082	0.053	0.059	0.042	0.024
R3	0.063	0.069	0.009	0.071	-0.056
R4	0.147	0.133	0.099	0.168	0.059
R5	0.058	0.060	0.032	0.071	-0.036

Correlations

	F6	F7	F8	F9	F10
F6	1.000				
F7	0.252	1.000			
F8	0.295	0.237	1.000		
F9	0.344	0.278	0.353	1.000	
F10	0.313	0.320	0.312	0.347	1.000
G5	0.080	0.046	0.079	0.058	0.038
G11	0.073	0.060	0.073	0.074	0.063
G12	0.064	0.042	0.067	0.091	0.028
G13	0.041	0.045	0.039	0.079	0.045
R3	0.048	-0.018	-0.045	0.045	0.036
R4	0.111	0.045	0.045	0.115	0.108
R5	0.057	0.020	-0.051	0.053	0.053

Correlations

	G5	G11	G12	G13	R3
G5	1.000				
G11	0.323	1.000			
G12	0.207	0.333	1.000		
G13	0.093	0.112	0.159	1.000	
R3	0.040	0.053	0.071	0.093	1.000
R4	0.060	0.063	0.099	0.090	0.553
R5	0.029	0.048	0.053	0.075	0.482

Correlations

	R4	R5
R4	1.000	
R5	0.365	1.000

MAXIMUM LOG-LIKELIHOOD VALUE FOR THE UNRESTRICTED (H1) MODEL IS -100369.377

UNIVARIATE SAMPLE STATISTICS

UNIVARIATE HIGHER-ORDER MOMENT DESCRIPTIVE STATISTICS

Variable/ Sample Size	Mean/ Variance	Skewness/ Kurtosis	Minimum/ Maximum	% with Min/Max	Percentiles 20%/60%	40%/80%	Median
F1	0.491	1.541	0.000	69.52%	0.000	0.000	0.000
5430.000	0.691	1.240	3.000	3.44%	0.000	1.000	
F2	0.606	1.244	0.000	62.97%	0.000	0.000	0.000
5436.000	0.804	0.342	3.000	4.67%	0.000	1.000	
F3	0.499	1.540	0.000	69.35%	0.000	0.000	0.000
5438.000	0.711	1.230	3.000	3.82%	0.000	1.000	
F4	0.606	1.348	0.000	64.92%	0.000	0.000	0.000
5434.000	0.886	0.546	3.000	6.83%	0.000	1.000	
F5	0.743	1.097	0.000	58.81%	0.000	0.000	0.000
5377.000	1.059	-0.176	3.000	10.30%	1.000	2.000	
F6	0.325	2.226	0.000	79.72%	0.000	0.000	0.000
5433.000	0.513	4.067	3.000	2.45%	0.000	1.000	
F7	0.881	0.830	0.000	51.82%	0.000	0.000	0.000
5436.000	1.146	-0.714	3.000	12.12%	1.000	2.000	
F8	0.513	1.537	0.000	68.11%	0.000	0.000	0.000
5434.000	0.725	1.270	3.000	4.34%	0.000	1.000	
F9	0.481	1.647	0.000	71.12%	0.000	0.000	0.000
5439.000	0.722	1.564	3.000	4.41%	0.000	1.000	
F10	0.639	1.220	0.000	61.72%	0.000	0.000	0.000
5429.000	0.862	0.261	3.000	5.95%	0.000	1.000	
G5	0.197	1.520	0.000	80.25%	0.000	0.000	0.000
5439.000	0.158	0.310	1.000	19.75%	0.000	0.000	
G11	0.256	1.116	0.000	74.36%	0.000	0.000	0.000
5437.000	0.191	-0.755	1.000	25.64%	0.000	1.000	
G12	0.196	1.530	0.000	80.39%	0.000	0.000	0.000
5440.000	0.158	0.342	1.000	19.61%	0.000	0.000	
G13	0.235	1.252	0.000	76.53%	0.000	0.000	0.000

```
            5440.000       0.180      -0.433       1.000   23.47%       0.000
1.000
     R3                    2.681       0.286       1.000   27.20%       1.000
2.000      3.000
            5433.000       1.897      -1.123       5.000   14.19%       3.000
4.000
     R4                    2.113       0.819       1.000   47.86%       1.000
1.000      2.000
            5432.000       1.660      -0.551       5.000    6.61%       2.000
3.000
     R5                    3.890      -0.895       1.000    9.29%       3.000
4.000      5.000
            5427.000       1.859      -0.536       5.000   51.06%       5.000
5.000


THE MODEL ESTIMATION TERMINATED NORMALLY



MODEL FIT INFORMATION

Number of Free Parameters                       54

Loglikelihood

          H0 Value                    -101105.921
          H1 Value                    -100369.377

Information Criteria

          Akaike (AIC)                 202319.842
          Bayesian (BIC)               202676.345
          Sample-Size Adjusted BIC     202504.750
            (n* = (n + 2) / 24)

Chi-Square Test of Model Fit

          Value                           1473.088
          Degrees of Freedom                   116
          P-Value                           0.0000

RMSEA (Root Mean Square Error Of Approximation)

          Estimate                           0.046
          90 Percent C.I.                    0.044  0.048
          Probability RMSEA <= .05           0.998

CFI/TLI

          CFI                                0.931
          TLI                                0.919

Chi-Square Test of Model Fit for the Baseline Model

          Value                          19855.834
          Degrees of Freedom                   136
          P-Value                           0.0000

SRMR (Standardized Root Mean Square Residual)

          Value                              0.036
```

MODEL RESULTS

		Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Y	BY				
	F1	1.000	0.000	999.000	999.000
	F2	0.999	0.033	30.513	0.000
	F3	1.252	0.036	34.898	0.000
	F4	1.222	0.037	32.682	0.000
	F5	0.816	0.040	20.652	0.000
	F6	0.800	0.029	27.425	0.000
	F7	1.017	0.038	27.075	0.000
	F8	0.946	0.037	25.901	0.000
	F9	1.006	0.036	27.963	0.000
	F10	1.134	0.039	29.326	0.000
X	BY				
	G5	1.000	0.000	999.000	999.000
	G11	1.535	0.084	18.193	0.000
	G12	1.072	0.071	15.074	0.000
	G13	0.513	0.053	9.635	0.000
REL	BY				
	R3	1.000	0.000	999.000	999.000
	R4	0.745	0.022	33.234	0.000
	R5	0.677	0.019	34.865	0.000
Y	ON				
	REL	0.035	0.009	4.124	0.000
	X	0.520	0.064	8.106	0.000
REL	ON				
	X	0.930	0.141	6.586	0.000
Intercepts					
	F1	0.492	0.011	43.096	0.000
	F2	0.607	0.012	49.087	0.000
	F3	0.499	0.011	43.778	0.000
	F4	0.606	0.012	48.541	0.000
	F5	0.742	0.014	53.181	0.000
	F6	0.325	0.010	33.326	0.000
	F7	0.881	0.014	61.018	0.000
	F8	0.513	0.012	44.354	0.000
	F9	0.481	0.011	41.975	0.000
	F10	0.639	0.012	51.133	0.000
	G5	0.197	0.005	36.561	0.000
	G11	0.257	0.006	42.434	0.000
	G12	0.196	0.005	36.470	0.000
	G13	0.235	0.006	40.870	0.000
	R3	2.681	0.019	144.099	0.000
	R4	2.114	0.017	121.453	0.000
	R5	3.889	0.018	211.154	0.000
Variances					
	X	0.035	0.003	11.229	0.000
Residual Variances					
	F1	0.437	0.013	34.496	0.000
	F2	0.551	0.014	38.267	0.000
	F3	0.312	0.010	29.919	0.000

F4	0.506	0.016	31.973	0.000
F5	0.889	0.021	42.035	0.000
F6	0.351	0.012	30.070	0.000
F7	0.883	0.019	47.397	0.000
F8	0.497	0.015	33.987	0.000
F9	0.464	0.013	34.458	0.000
F10	0.535	0.015	36.174	0.000
G5	0.124	0.004	34.522	0.000
G11	0.109	0.005	19.933	0.000
G12	0.118	0.004	31.675	0.000
G13	0.171	0.003	52.111	0.000
R3	0.578	0.039	14.935	0.000
R4	0.929	0.027	34.402	0.000
R5	1.253	0.027	46.051	0.000
Y	0.242	0.014	17.823	0.000
REL	1.289	0.047	27.708	0.000

STANDARDIZED MODEL RESULTS

STDYX Standardization

		Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Y	BY				
F1		0.607	0.013	45.842	0.000
F2		0.562	0.014	40.716	0.000
F3		0.749	0.010	74.238	0.000
F4		0.655	0.012	55.114	0.000
F5		0.400	0.016	25.712	0.000
F6		0.563	0.015	37.885	0.000
F7		0.479	0.013	35.858	0.000
F8		0.560	0.014	40.034	0.000
F9		0.597	0.014	42.914	0.000
F10		0.616	0.013	48.947	0.000
X	BY				
G5		0.467	0.020	23.804	0.000
G11		0.654	0.021	30.525	0.000
G12		0.502	0.020	24.819	0.000
G13		0.225	0.020	11.039	0.000
REL	BY				
R3		0.834	0.012	67.037	0.000
R4		0.664	0.012	54.488	0.000
R5		0.571	0.011	53.592	0.000
Y	ON				
REL		0.080	0.019	4.313	0.000
X		0.192	0.021	9.026	0.000
REL	ON				
X		0.151	0.022	6.912	0.000
Intercepts					
F1		0.591	0.008	70.180	0.000
F2		0.677	0.009	75.421	0.000
F3		0.592	0.008	71.430	0.000
F4		0.644	0.008	77.098	0.000
F5		0.721	0.009	79.844	0.000
F6		0.454	0.008	60.314	0.000

F7	0.823	0.010	83.930	0.000
F8	0.602	0.008	72.760	0.000
F9	0.566	0.008	70.481	0.000
F10	0.688	0.009	78.156	0.000
G5	0.496	0.008	58.664	0.000
G11	0.588	0.009	63.110	0.000
G12	0.494	0.008	58.612	0.000
G13	0.554	0.009	62.540	0.000
R3	1.947	0.015	126.363	0.000
R4	1.641	0.011	154.432	0.000
R5	2.853	0.035	82.381	0.000
Variances				
X	1.000	0.000	*********	0.000
Residual Variances				
F1	0.632	0.016	39.395	0.000
F2	0.684	0.015	44.152	0.000
F3	0.439	0.015	29.060	0.000
F4	0.571	0.016	36.676	0.000
F5	0.840	0.012	67.336	0.000
F6	0.683	0.017	40.865	0.000
F7	0.771	0.013	60.194	0.000
F8	0.686	0.016	43.729	0.000
F9	0.643	0.017	38.709	0.000
F10	0.621	0.016	40.027	0.000
G5	0.782	0.018	42.649	0.000
G11	0.572	0.028	20.421	0.000
G12	0.748	0.020	36.776	0.000
G13	0.949	0.009	102.612	0.000
R3	0.305	0.021	14.684	0.000
R4	0.560	0.016	34.614	0.000
R5	0.674	0.012	55.466	0.000
Y	0.952	0.009	109.717	0.000
REL	0.977	0.007	147.361	0.000

STD Standardization

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Y BY				
F1	0.504	0.014	35.396	0.000
F2	0.504	0.015	34.107	0.000
F3	0.631	0.014	46.755	0.000
F4	0.616	0.014	43.800	0.000
F5	0.412	0.016	25.040	0.000
F6	0.403	0.015	27.742	0.000
F7	0.513	0.015	33.370	0.000
F8	0.477	0.014	33.112	0.000
F9	0.507	0.015	33.015	0.000
F10	0.572	0.014	39.776	0.000
X BY				
G5	0.186	0.008	22.412	0.000
G11	0.286	0.010	29.225	0.000
G12	0.199	0.009	23.211	0.000
G13	0.095	0.009	10.949	0.000
REL BY				
R3	1.148	0.020	57.912	0.000
R4	0.855	0.019	45.381	0.000

R5	0.778	0.017	45.726	0.000
Y ON				
REL	0.080	0.019	4.313	0.000
X	0.192	0.021	9.026	0.000
REL ON				
X	0.151	0.022	6.912	0.000
Intercepts				
F1	0.492	0.011	43.096	0.000
F2	0.607	0.012	49.087	0.000
F3	0.499	0.011	43.778	0.000
F4	0.606	0.012	48.541	0.000
F5	0.742	0.014	53.181	0.000
F6	0.325	0.010	33.326	0.000
F7	0.881	0.014	61.018	0.000
F8	0.513	0.012	44.354	0.000
F9	0.481	0.011	41.975	0.000
F10	0.639	0.012	51.133	0.000
G5	0.197	0.005	36.561	0.000
G11	0.257	0.006	42.434	0.000
G12	0.196	0.005	36.470	0.000
G13	0.235	0.006	40.870	0.000
R3	2.681	0.019	144.099	0.000
R4	2.114	0.017	121.453	0.000
R5	3.889	0.018	211.154	0.000
Variances				
X	1.000	0.000	*********	0.000
Residual Variances				
F1	0.437	0.013	34.496	0.000
F2	0.551	0.014	38.267	0.000
F3	0.312	0.010	29.919	0.000
F4	0.506	0.016	31.973	0.000
F5	0.889	0.021	42.035	0.000
F6	0.351	0.012	30.070	0.000
F7	0.883	0.019	47.397	0.000
F8	0.497	0.015	33.987	0.000
F9	0.464	0.013	34.458	0.000
F10	0.535	0.015	36.174	0.000
G5	0.124	0.004	34.522	0.000
G11	0.109	0.005	19.933	0.000
G12	0.118	0.004	31.675	0.000
G13	0.171	0.003	52.111	0.000
R3	0.578	0.039	14.935	0.000
R4	0.929	0.027	34.402	0.000
R5	1.253	0.027	46.051	0.000
Y	0.952	0.009	109.717	0.000
REL	0.977	0.007	147.361	0.000

R-SQUARE

Observed Variable	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
F1	0.368	0.016	22.935	0.000
F2	0.316	0.015	20.382	0.000
F3	0.561	0.015	37.122	0.000
F4	0.429	0.016	27.553	0.000
F5	0.160	0.012	12.846	0.000

F6	0.317	0.017	18.967	0.000
F7	0.229	0.013	17.928	0.000
F8	0.314	0.016	20.030	0.000
F9	0.357	0.017	21.467	0.000
F10	0.379	0.016	24.475	0.000
G5	0.218	0.018	11.922	0.000
G11	0.428	0.028	15.269	0.000
G12	0.252	0.020	12.410	0.000
G13	0.051	0.009	5.488	0.000
R3	0.695	0.021	33.513	0.000
R4	0.440	0.016	27.249	0.000
R5	0.326	0.012	26.791	0.000

Latent Variable	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Y	0.048	0.009	5.514	0.000
REL	0.023	0.007	3.426	0.001

TOTAL, TOTAL INDIRECT, SPECIFIC INDIRECT, AND DIRECT EFFECTS

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Effects from X to Y				
Total	0.553	0.064	8.614	0.000
Total indirect	0.033	0.009	3.553	0.000
Specific indirect				
Y				
REL				
X	0.033	0.009	3.553	0.000
Direct				
Y				
X	0.520	0.064	8.106	0.000

STANDARDIZED TOTAL, TOTAL INDIRECT, SPECIFIC INDIRECT, AND DIRECT EFFECTS

STDYX Standardization

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Effects from X to Y				
Total	0.204	0.021	9.757	0.000
Total indirect	0.012	0.003	3.660	0.000
Specific indirect				
Y				
REL				
X	0.012	0.003	3.660	0.000
Direct				

Y				
X	0.192	0.021	9.026	0.000

STD Standardization

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Effects from X to Y				
Total	0.204	0.021	9.757	0.000
Total indirect	0.012	0.003	3.660	0.000
Specific indirect				
Y				
REL				
X	0.012	0.003	3.660	0.000
Direct				
Y				
X	0.192	0.021	9.026	0.000

CONFIDENCE INTERVALS OF MODEL RESULTS

	Lower .5%	Lower 2.5%	Lower 5%	Estimate	Upper 5%	Upper 2.5%	Upper .5%
Y BY							
F1	1.000	1.000	1.000	1.000	1.000	1.000	1.000
F2	0.919	0.938	0.947	0.999	1.054	1.065	1.086
F3	1.165	1.183	1.195	1.252	1.313	1.326	1.350
F4	1.130	1.151	1.162	1.222	1.285	1.298	1.323
F5	0.719	0.742	0.753	0.816	0.885	0.897	0.925
F6	0.726	0.743	0.753	0.800	0.849	0.858	0.877
F7	0.922	0.945	0.957	1.017	1.079	1.091	1.120
F8	0.852	0.876	0.888	0.946	1.008	1.020	1.043
F9	0.917	0.939	0.948	1.006	1.067	1.078	1.107
F10	1.038	1.061	1.071	1.134	1.199	1.214	1.238
X BY							
G5	1.000	1.000	1.000	1.000	1.000	1.000	1.000
G11	1.342	1.389	1.408	1.535	1.684	1.716	1.785
G12	0.909	0.944	0.963	1.072	1.197	1.222	1.275

```
    G13                0.387       0.416       0.432       0.513       0.607       0.624
0.659

 REL      BY
    R3                 1.000       1.000       1.000       1.000       1.000       1.000
1.000
    R4                 0.687       0.701       0.709       0.745       0.782       0.790
0.801
    R5                 0.629       0.640       0.646       0.677       0.710       0.716
0.730

 Y        ON
    REL                0.015       0.019       0.021       0.035       0.049       0.052
0.058
    X                  0.369       0.400       0.421       0.520       0.630       0.652
0.700

 REL      ON
    X                  0.598       0.660       0.702       0.930       1.175       1.219
1.315

 Intercepts
    F1                 0.462       0.469       0.473       0.492       0.511       0.514
0.521
    F2                 0.575       0.583       0.587       0.607       0.627       0.632
0.640
    F3                 0.471       0.477       0.480       0.499       0.518       0.522
0.528
    F4                 0.574       0.582       0.585       0.606       0.627       0.630
0.638
    F5                 0.707       0.716       0.720       0.742       0.766       0.770
0.777
    F6                 0.300       0.306       0.309       0.325       0.342       0.345
0.351
    F7                 0.845       0.852       0.857       0.881       0.905       0.909
0.918
    F8                 0.484       0.490       0.494       0.513       0.532       0.535
0.542
    F9                 0.453       0.459       0.462       0.481       0.500       0.504
0.512
    F10                0.608       0.615       0.619       0.639       0.660       0.664
0.673
    G5                 0.184       0.187       0.189       0.197       0.206       0.208
0.211
    G11                0.241       0.245       0.247       0.257       0.267       0.269
0.272
    G12                0.182       0.185       0.187       0.196       0.205       0.206
0.210
    G13                0.220       0.224       0.225       0.235       0.244       0.246
0.250
    R3                 2.632       2.645       2.650       2.681       2.711       2.718
2.730
    R4                 2.069       2.080       2.086       2.114       2.143       2.148
2.159
    R5                 3.842       3.852       3.858       3.889       3.919       3.924
3.934

 Variances
    X                  0.027       0.029       0.030       0.035       0.040       0.041
0.043

 Residual Variances
```

F1	0.403	0.412	0.416	0.437	0.458	0.462
0.470						
F2	0.514	0.523	0.527	0.551	0.574	0.578
0.588						
F3	0.286	0.292	0.295	0.312	0.329	0.332
0.339						
F4	0.465	0.475	0.479	0.506	0.531	0.537
0.546						
F5	0.833	0.847	0.855	0.889	0.923	0.930
0.943						
F6	0.321	0.327	0.331	0.351	0.369	0.373
0.380						
F7	0.834	0.846	0.852	0.883	0.913	0.919
0.930						
F8	0.459	0.468	0.473	0.497	0.521	0.525
0.535						
F9	0.430	0.438	0.442	0.464	0.487	0.491
0.499						
F10	0.497	0.507	0.511	0.535	0.560	0.564
0.574						
G5	0.114	0.117	0.118	0.124	0.130	0.131
0.133						
G11	0.094	0.098	0.100	0.109	0.118	0.120
0.123						
G12	0.108	0.110	0.112	0.118	0.124	0.125
0.127						
G13	0.162	0.164	0.165	0.171	0.176	0.177
0.178						
R3	0.469	0.499	0.514	0.578	0.641	0.651
0.671						
R4	0.860	0.876	0.885	0.929	0.973	0.981
0.999						
R5	1.184	1.199	1.207	1.253	1.297	1.306
1.322						
Y	0.209	0.216	0.220	0.242	0.265	0.270
0.278						
REL	1.170	1.198	1.212	1.289	1.364	1.380
1.417						

CONFIDENCE INTERVALS OF STANDARDIZED MODEL RESULTS

STDYX Standardization

	Lower .5%	Lower 2.5%	Lower 5%	Estimate	Upper 5%	Upper 2.5%	Upper .5%
Y BY							
F1	0.571	0.580	0.584	0.607	0.628	0.632	0.639
F2	0.525	0.534	0.539	0.562	0.584	0.588	0.597
F3	0.722	0.729	0.732	0.749	0.765	0.769	0.775
F4	0.624	0.631	0.635	0.655	0.675	0.678	0.686
F5	0.360	0.370	0.375	0.400	0.426	0.431	0.439
F6	0.520	0.533	0.539	0.563	0.587	0.591	0.600
F7	0.445	0.452	0.457	0.479	0.501	0.505	0.513

F8	0.522	0.533	0.537	0.560	0.583	0.588
0.594						
F9	0.561	0.570	0.574	0.597	0.620	0.624
0.632						
F10	0.584	0.591	0.595	0.616	0.637	0.641
0.648						
X BY						
G5	0.415	0.428	0.434	0.467	0.499	0.505
0.517						
G11	0.598	0.612	0.619	0.654	0.689	0.695
0.709						
G12	0.449	0.463	0.468	0.502	0.536	0.542
0.553						
G13	0.174	0.186	0.193	0.225	0.260	0.266
0.278						
REL BY						
R3	0.802	0.810	0.813	0.834	0.854	0.858
0.868						
R4	0.634	0.639	0.643	0.664	0.683	0.687
0.695						
R5	0.543	0.550	0.553	0.571	0.589	0.592
0.598						
Y ON						
REL	0.033	0.044	0.049	0.080	0.110	0.116
0.128						
X	0.136	0.150	0.157	0.192	0.227	0.234
0.246						
REL ON						
X	0.097	0.108	0.114	0.151	0.187	0.194
0.208						
Intercepts						
F1	0.570	0.575	0.578	0.591	0.605	0.608
0.613						
F2	0.654	0.659	0.662	0.677	0.691	0.694
0.701						
F3	0.570	0.576	0.578	0.592	0.605	0.608
0.614						
F4	0.622	0.627	0.630	0.644	0.658	0.660
0.665						
F5	0.699	0.704	0.707	0.721	0.737	0.739
0.746						
F6	0.434	0.440	0.442	0.454	0.467	0.469
0.473						
F7	0.798	0.804	0.807	0.823	0.839	0.843
0.848						
F8	0.581	0.587	0.589	0.602	0.616	0.619
0.624						
F9	0.546	0.551	0.553	0.566	0.580	0.582
0.587						
F10	0.666	0.671	0.674	0.688	0.703	0.706
0.712						
G5	0.474	0.479	0.482	0.496	0.510	0.512
0.517						
G11	0.564	0.570	0.572	0.588	0.603	0.606
0.611						
G12	0.472	0.477	0.480	0.494	0.508	0.510
0.516						

```
    G13              0.531       0.537       0.539       0.554       0.569       0.572
0.577
    R3               1.907       1.917       1.922       1.947       1.972       1.977
1.988
    R4               1.614       1.620       1.623       1.641       1.659       1.662
1.668
    R5               2.768       2.787       2.797       2.853       2.911       2.923
2.941

 Variances
    X                1.000       1.000       1.000       1.000       1.000       1.000
1.000

 Residual Variances
    F1               0.591       0.600       0.605       0.632       0.659       0.664
0.673
    F2               0.643       0.654       0.659       0.684       0.710       0.715
0.724
    F3               0.400       0.409       0.414       0.439       0.464       0.468
0.479
    F4               0.530       0.540       0.545       0.571       0.597       0.601
0.610
    F5               0.807       0.814       0.819       0.840       0.860       0.863
0.870
    F6               0.640       0.650       0.655       0.683       0.710       0.716
0.729
    F7               0.736       0.745       0.749       0.771       0.791       0.795
0.802
    F8               0.646       0.655       0.660       0.686       0.711       0.715
0.728
    F9               0.599       0.611       0.616       0.643       0.670       0.675
0.685
    F10              0.580       0.590       0.595       0.621       0.646       0.650
0.658
    G5               0.732       0.745       0.751       0.782       0.811       0.817
0.828
    G11              0.498       0.516       0.526       0.572       0.617       0.625
0.642
    G12              0.695       0.706       0.713       0.748       0.781       0.786
0.798
    G13              0.923       0.929       0.933       0.949       0.963       0.965
0.970
    R3               0.247       0.263       0.270       0.305       0.339       0.344
0.356
    R4               0.517       0.527       0.533       0.560       0.586       0.591
0.599
    R5               0.642       0.649       0.653       0.674       0.694       0.697
0.705
    Y                0.927       0.933       0.936       0.952       0.965       0.967
0.971
    REL              0.957       0.962       0.965       0.977       0.987       0.988
0.990


STD Standardization

                  Lower .5%  Lower 2.5%    Lower 5%    Estimate    Upper 5%  Upper
2.5%   Upper .5%

 Y        BY
    F1               0.467       0.476       0.481       0.504       0.528       0.533
0.541
```

	F2	0.466	0.475	0.479	0.504	0.528	0.533
0.542							
	F3	0.597	0.605	0.609	0.631	0.654	0.658
0.666							
	F4	0.581	0.589	0.593	0.616	0.640	0.644
0.653							
	F5	0.369	0.379	0.385	0.412	0.439	0.445
0.453							
	F6	0.364	0.375	0.380	0.403	0.427	0.432
0.441							
	F7	0.473	0.482	0.488	0.513	0.539	0.543
0.551							
	F8	0.439	0.449	0.454	0.477	0.501	0.505
0.513							
	F9	0.467	0.478	0.482	0.507	0.532	0.538
0.548							
	F10	0.535	0.544	0.549	0.572	0.596	0.600
0.609							
X	BY						
	G5	0.164	0.169	0.172	0.186	0.199	0.202
0.207							
	G11	0.260	0.266	0.269	0.286	0.302	0.304
0.310							
	G12	0.177	0.183	0.185	0.199	0.214	0.216
0.221							
	G13	0.073	0.079	0.082	0.095	0.110	0.113
0.118							
REL	BY						
	R3	1.097	1.109	1.115	1.148	1.180	1.187
1.200							
	R4	0.808	0.819	0.823	0.855	0.886	0.892
0.903							
	R5	0.735	0.745	0.750	0.778	0.806	0.812
0.820							
Y	ON						
	REL	0.033	0.044	0.049	0.080	0.110	0.116
0.128							
	X	0.136	0.150	0.157	0.192	0.227	0.234
0.246							
REL	ON						
	X	0.097	0.108	0.114	0.151	0.187	0.194
0.208							
Intercepts							
	F1	0.462	0.469	0.473	0.492	0.511	0.514
0.521							
	F2	0.575	0.583	0.587	0.607	0.627	0.632
0.640							
	F3	0.471	0.477	0.480	0.499	0.518	0.522
0.528							
	F4	0.574	0.582	0.585	0.606	0.627	0.630
0.638							
	F5	0.707	0.716	0.720	0.742	0.766	0.770
0.777							
	F6	0.300	0.306	0.309	0.325	0.342	0.345
0.351							
	F7	0.845	0.852	0.857	0.881	0.905	0.909
0.918							

F8	0.484	0.490	0.494	0.513	0.532	0.535
0.542						
F9	0.453	0.459	0.462	0.481	0.500	0.504
0.512						
F10	0.608	0.615	0.619	0.639	0.660	0.664
0.673						
G5	0.184	0.187	0.189	0.197	0.206	0.208
0.211						
G11	0.241	0.245	0.247	0.257	0.267	0.269
0.272						
G12	0.182	0.185	0.187	0.196	0.205	0.206
0.210						
G13	0.220	0.224	0.225	0.235	0.244	0.246
0.250						
R3	2.632	2.645	2.650	2.681	2.711	2.718
2.730						
R4	2.069	2.080	2.086	2.114	2.143	2.148
2.159						
R5	3.842	3.852	3.858	3.889	3.919	3.924
3.934						
Variances						
X	1.000	1.000	1.000	1.000	1.000	1.000
1.000						
Residual Variances						
F1	0.403	0.412	0.416	0.437	0.458	0.462
0.470						
F2	0.514	0.523	0.527	0.551	0.574	0.578
0.588						
F3	0.286	0.292	0.295	0.312	0.329	0.332
0.339						
F4	0.465	0.475	0.479	0.506	0.531	0.537
0.546						
F5	0.833	0.847	0.855	0.889	0.923	0.930
0.943						
F6	0.321	0.327	0.331	0.351	0.369	0.373
0.380						
F7	0.834	0.846	0.852	0.883	0.913	0.919
0.930						
F8	0.459	0.468	0.473	0.497	0.521	0.525
0.535						
F9	0.430	0.438	0.442	0.464	0.487	0.491
0.499						
F10	0.497	0.507	0.511	0.535	0.560	0.564
0.574						
G5	0.114	0.117	0.118	0.124	0.130	0.131
0.133						
G11	0.094	0.098	0.100	0.109	0.118	0.120
0.123						
G12	0.108	0.110	0.112	0.118	0.124	0.125
0.127						
G13	0.162	0.164	0.165	0.171	0.176	0.177
0.178						
R3	0.469	0.499	0.514	0.578	0.641	0.651
0.671						
R4	0.860	0.876	0.885	0.929	0.973	0.981
0.999						
R5	1.184	1.199	1.207	1.253	1.297	1.306
1.322						
Y	0.927	0.933	0.936	0.952	0.965	0.967
0.971						

```
    REL              0.957       0.962       0.965       0.977       0.987       0.988
0.990

CONFIDENCE INTERVALS OF TOTAL, TOTAL INDIRECT, SPECIFIC INDIRECT, AND DIRECT EFFECTS


                 Lower .5%  Lower 2.5%    Lower 5%    Estimate    Upper 5%  Upper
2.5%   Upper .5%

Effects from X to Y

  Total              0.404       0.433       0.453       0.553       0.662       0.685
0.740
  Total indirect     0.013       0.016       0.019       0.033       0.049       0.053
0.059

  Specific indirect

    Y
    REL
    X                0.013       0.016       0.019       0.033       0.049       0.053
0.059

  Direct
    Y
    X                0.369       0.400       0.421       0.520       0.630       0.652
0.700


CONFIDENCE INTERVALS OF STANDARDIZED TOTAL, TOTAL INDIRECT, SPECIFIC INDIRECT, AND
DIRECT EFFECTS


STDYX Standardization

                 Lower .5%  Lower 2.5%    Lower 5%    Estimate    Upper 5%  Upper
2.5%   Upper .5%

Effects from X to Y

  Total              0.149       0.163       0.170       0.204       0.238       0.245
0.257
  Total indirect     0.005       0.006       0.007       0.012       0.018       0.019
0.022

  Specific indirect

    Y
    REL
    X                0.005       0.006       0.007       0.012       0.018       0.019
0.022

  Direct
    Y
    X                0.136       0.150       0.157       0.192       0.227       0.234
0.246


STD Standardization
```

	Lower .5%	Lower 2.5%	Lower 5%	Estimate	Upper 5%	Upper 2.5%	Upper .5%
Effects from X to Y							
Total	0.149	0.163	0.170	0.204	0.238	0.245	0.257
Total indirect	0.005	0.006	0.007	0.012	0.018	0.019	0.022
Specific indirect							
Y REL X	0.005	0.006	0.007	0.012	0.018	0.019	0.022
Direct Y X	0.136	0.150	0.157	0.192	0.227	0.234	0.246

```
     Beginning Time:  14:08:41
        Ending Time:  14:12:20
       Elapsed Time:  00:03:39
```

MUTHEN & MUTHEN
3463 Stoner Ave.
Los Angeles, CA 90066

Tel: (310) 391-9971
Fax: (310) 391-8971
Web: www.StatModel.com
Support: Support@StatModel.com

APPENDIX C: Manuscript II IRB Approval

Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120, Virginia Tech
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website http://www.irb.vt.edu

MEMORANDUM

DATE: May 31, 2017

TO: Laura Prouty Sands, Aaron Michael Ogletree, Rosemary Blieszner, Mark Brennan-Ing

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)

PROTOCOL TITLE: Research on Older Adults with HIV (ROAH) at VT

IRB NUMBER: **17-552**

Effective May 30, 2017, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the New Application request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

http://www.irb.vt.edu/pages/responsibilities.htm

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As:	**Exempt, under 45 CFR 46.110 category(ies) 4**
Protocol Approval Date:	**May 30, 2017**
Protocol Expiration Date:	**N/A**
Continuing Review Due Date*:	**N/A**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

APPENDIX D: Manuscript II Final Model Output

```
Mplus VERSION 8 (Mac)
MUTHEN & MUTHEN
03/28/2018   9:25 AM

INPUT INSTRUCTIONS

  Title:
    Stata2Mplus conversion for /Users/aaronogletree/Desktop/ACRIA/ROAH
    Working File 032818.dta.dta
    List of variables converted shown below

    caseid : case identification number
    age : age
    gender : gender
      1: Male
    employ : employment status
      1: Working
      2: Retired
      3: Unemployed
      5: Disability
      6: Volunteer
      7: Other
    educate : highest level of education attained
      1: Elementary
      2: Some high school
      3: HS graduate
      4: Some college
      5: College grad
      6: Graduate school
      7: Vocational
      8: Other
    latino : HISPANIC
      0: NO
    race : What race do you consider yourself to be?
      1: Black or African-American or Caribbean
      2: Asian or Asian-American
      3: Pacific Islander
      4: American Indian or Alaskan Native
      5: White or Caucasian
      6: Some other race
    slfhlth : Self rating of physical health
    illa : Arthritis
      0: No
      1: Yes
    illb : Broken Bones
      0: No
      1: Yes
    illc : Cancer
      0: No
      1: Yes
    illd : Depression
      0: No
      1: Yes
    ille : Dermatological (skin) problems
      0: No
      1: Yes
    illf : Diabetes
      0: No
      1: Yes
    illg : Hearing loss
```

```
  0: No
  1: Yes
illh : Heart condition
  0: No
  1: Yes
illi : Hepatitis
  0: No
  1: Yes
illj : Herpes
  0: No
  1: Yes
illk : Hypertension
  0: No
  1: Yes
illl : Impotence
  0: No
  1: Yes
illm : Menopause
  0: No
  1: Yes
illn : Menstrual difficulties
  0: No
  1: Yes
illo : Migraines
  0: No
  1: Yes
illp : Nervous system disorder
  0: No
  1: Yes
illq : Neuropathy
  0: No
  1: Yes
illr : Pneumonia
  0: No
  1: Yes
ills : Respiratory condition
  0: No
  1: Yes
illt : Sexually transmitted disease
  0: No
  1: Yes
illu : Shingles
  0: No
  1: Yes
illv : Staph. infection
  0: No
  1: Yes
illw : Stroke
  0: No
  1: Yes
illx : Vision loss
  0: No
  1: Yes
illy : Response "Other"
  0: No
  1: Yes
aidsdiag : have you been diagnosed with AIDS?
  0: No
  1: Yes
txa : Private Doctor
  0: No
  1: Yes
txb : Public clinic or hospital
```

```
  0: No
  1: Yes
txc : Veterans Administration hospital (VA)
  0: No
  1: Yes
txd : Day program/treatment facility (ASO)
  0: No
  1: Yes
txe : Ryan White funded clinic
  0: No
  1: Yes
cesd01 : Somatic Complaints 1
  0: 0 days
  1: 1-2 days
  2: 3-4 days
  3: 5-7 days
cesd05 : Somatic Complaints 3
  0: 0 days
  1: 1-2 days
  2: 3-4 days
  3: 5-7 days
cesd06 : Negative Affect 2
  0: 0 days
  1: 1-2 days
  2: 3-4 days
  3: 5-7 days
cesd07 : Somatic Complaints 4
  0: 0 days
  1: 1-2 days
  2: 3-4 days
  3: 5-7 days
cesd08 : Positive Affect 2
  0: 0 days
  1: 1-2 days
  2: 3-4 days
  3: 5-7 days
cesd10 : Negative Affect 4
  0: 0 days
  1: 1-2 days
  2: 3-4 days
  3: 5-7 days
cesd11 : Somatic Complaints 5
  0: 0 days
  1: 1-2 days
  2: 3-4 days
  3: 5-7 days
cesd12 : Positive Affect 3
  0: 0 days
  1: 1-2 days
  2: 3-4 days
  3: 5-7 days
cesd14 : Negative Affect 5
  0: 0 days
  1: 1-2 days
  2: 3-4 days
  3: 5-7 days
cesd20 : Somatic Complaints 7
  0: 0 days
  1: 1-2 days
  2: 3-4 days
  3: 5-7 days
orient : Sexual orientation
  1: Straight
```

```
    2: Bisexual
    3: Gay/Lesbian
    4: Other
  income : Income adequacy
    1: Do not have enough
    2: Just manage to get by
    3: Enough, with a little extra
    4: Money is not a problem
  qol_pf : QOL: PHYSICAL FUNCTION transformed score
  qol_sf : QOL: SOCIAL FUNCTION transformed score
  qol_cf : QOL: COGNITIVE FUNCTION transformed score
  qol_p : QOL: PAIN transformed score
  qol_ef : QOL: ENERGY/FATIGUE transformed score
  ADEQADL : ADEQUACY OF INSTRUMENTAL HELP
    1: A LOT MORE
    2: SOME MORE
    3: A LITTLE MORE
    4: GOT ALL NEEDED
  ADEQEMOT : ADEQUACY OF EMOTIONAL SUPPORT
    1: A LOT MORE
    2: SOME MORE
    3: A LITTLE MORE
    4: GOT ALL NEEDED
  NEWCESD : CESD DEPRESSION SCALE NEW
    99: MISSING
  AGECC :
  CESD10 :
  HIVCC :

Data:
  File is /Users/aaronogletree/Desktop/ACRIA/ROAH Working File
  032818.dta.dat ;
Variable:
  Names are
     caseid age gender employ educate latino race slfhlth illa illb illc
     illd ille illf illg illh illi illj illk illl illm illn illo illp illq
     illr ills illt illu illv illw illx illy aidsdiag txa txb txc txd txe
     cesd01 cesd05 cesd06 cesd07 cesd08 cesd10 cesd11 cesd12 cesd14 cesd20
     orient income qol_pf qol_sf qol_cf qol_p qol_ef ADEQADL ADEQEMOT NEWCESD
    AGECC CESDTOT HIVCC;
     Missing are all (-999);
     Usevariables are
            slfhlth ADEQADL ADEQEMOT cesd01 cesd05 cesd06
            cesd07 cesd08 cesd10 cesd11 cesd12 cesd14 cesd20
            AGECC HIVCC;
Analysis: BOOTSTRAP IS 5000;
MODEL:      CESD BY cesd01 cesd05 cesd06 cesd07 cesd08 cesd10
     cesd11 cesd12 cesd14 cesd20;
     (ADEQADL);
     (ADEQEMOT);
     (slfhlth);
     CESD ON HIVCC slfhlth AGECC ADEQADL ADEQEMOT;
     ADEQADL ON HIVCC slfhlth AGECC;
     ADEQEMOT ON HIVCC slfhlth AGECC;
     HIVCC WITH slfhlth;
     HIVCC WITH AGECC;
     AGECC WITH slfhlth;
     ADEQADL WITH ADEQEMOT;
MODEL INDIRECT:
     CESD IND ADEQADL HIVCC;
     CESD IND ADEQADL slfhlth;
     CESD IND ADEQADL AGECC;
     CESD IND ADEQEMOT HIVCC;
```

```
      CESD IND ADEQEMOT slfhlth;
      CESD IND ADEQEMOT AGECC;
  OUTPUT:    SAMPSTAT;
      STDYX;


INPUT READING TERMINATED NORMALLY



Stata2Mplus conversion for /Users/aaronogletree/Desktop/ACRIA/ROAH
Working File 032818.dta.dta
List of variables converted shown below

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employ : employment status
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2: Retired
3: Unemployed
5: Disability
6: Volunteer
7: Other
educate : highest level of education attained
1: Elementary
2: Some high school
3: HS graduate
4: Some college
5: College grad
6: Graduate school
7: Vocational
8: Other
latino : HISPANIC
0: NO
race : What race do you consider yourself to be?
1: Black or African-American or Caribbean
2: Asian or Asian-American
3: Pacific Islander
4: American Indian or Alaskan Native
5: White or Caucasian
6: Some other race
slfhlth : Self rating of physical health
illa : Arthritis
0: No
1: Yes
illb : Broken Bones
0: No
1: Yes
illc : Cancer
0: No
1: Yes
illd : Depression
0: No
1: Yes
ille : Dermatological (skin) problems
0: No
1: Yes
illf : Diabetes
0: No
```

1: Yes
illg : Hearing loss
0: No
1: Yes
illh : Heart condition
0: No
1: Yes
illi : Hepatitis
0: No
1: Yes
illj : Herpes
0: No
1: Yes
illk : Hypertension
0: No
1: Yes
illl : Impotence
0: No
1: Yes
illm : Menopause
0: No
1: Yes
illn : Menstrual difficulties
0: No
1: Yes
illo : Migraines
0: No
1: Yes
illp : Nervous system disorder
0: No
1: Yes
illq : Neuropathy
0: No
1: Yes
illr : Pneumonia
0: No
1: Yes
ills : Respiratory condition
0: No
1: Yes
illt : Sexually transmitted disease
0: No
1: Yes
illu : Shingles
0: No
1: Yes
illv : Staph. infection
0: No
1: Yes
illw : Stroke
0: No
1: Yes
illx : Vision loss
0: No
1: Yes
illy : Response "Other"
0: No
1: Yes
aidsdiag : have you been diagnosed with AIDS?
0: No
1: Yes
txa : Private Doctor
0: No

```
1: Yes
txb : Public clinic or hospital
0: No
1: Yes
txc : Veterans Administration hospital (VA)
0: No
1: Yes
txd : Day program/treatment facility (ASO)
0: No
1: Yes
txe : Ryan White funded clinic
0: No
1: Yes

SUMMARY OF ANALYSIS

Number of groups                                                 1
Number of observations                                         640

Number of dependent variables                                   12
Number of independent variables                                  3
Number of continuous latent variables                            1

Observed dependent variables

  Continuous
   ADEQADL     ADEQEMOT    CESD01      CESD05      CESD06      CESD07
   CESD08      CESD10      CESD11      CESD12      CESD14      CESD20

Observed independent variables
   SLFHLTH     AGECC       HIVCC

Continuous latent variables
   CESD


Estimator                                                       ML
Information matrix                                        OBSERVED
Maximum number of iterations                                  1000
Convergence criterion                                    0.500D-04
Maximum number of steepest descent iterations                   20
Maximum number of iterations for H1                           2000
Convergence criterion for H1                             0.100D-03
Number of bootstrap draws
    Requested                                                 5000
    Completed                                                 5000

Input data file(s)
  /Users/aaronogletree/Desktop/ACRIA/ROAH Working File 032818.dta.dat

Input data format  FREE


SUMMARY OF DATA

     Number of missing data patterns            41


COVARIANCE COVERAGE OF DATA

Minimum covariance coverage value   0.100
```

PROPORTION OF DATA PRESENT

Covariance Coverage

	ADEQADL	ADEQEMOT	CESD01	CESD05	CESD06
ADEQADL	0.966				
ADEQEMOT	0.961	0.980			
CESD01	0.956	0.970	0.991		
CESD05	0.950	0.959	0.972	0.980	
CESD06	0.958	0.972	0.984	0.973	0.992
CESD07	0.945	0.959	0.972	0.963	0.973
CESD08	0.942	0.958	0.970	0.959	0.970
CESD10	0.953	0.966	0.981	0.969	0.980
CESD11	0.950	0.963	0.973	0.966	0.975
CESD12	0.950	0.963	0.975	0.966	0.977
CESD14	0.941	0.955	0.967	0.958	0.969
CESD20	0.956	0.969	0.981	0.973	0.983
SLFHLTH	0.938	0.953	0.959	0.952	0.961
AGECC	0.964	0.978	0.989	0.978	0.991
HIVCC	0.948	0.963	0.972	0.961	0.973

Covariance Coverage

	CESD07	CESD08	CESD10	CESD11	CESD12
CESD07	0.980				
CESD08	0.959	0.977			
CESD10	0.969	0.964	0.986		
CESD11	0.964	0.959	0.969	0.981	
CESD12	0.964	0.961	0.970	0.966	0.983
CESD14	0.956	0.955	0.964	0.959	0.961
CESD20	0.972	0.967	0.978	0.973	0.973
SLFHLTH	0.948	0.948	0.955	0.950	0.953
AGECC	0.978	0.975	0.984	0.980	0.981
HIVCC	0.964	0.958	0.967	0.963	0.964

Covariance Coverage

	CESD14	CESD20	SLFHLTH	AGECC	HIVCC
CESD14	0.975				
CESD20	0.966	0.989			
SLFHLTH	0.947	0.958	0.969		
AGECC	0.973	0.988	0.967	0.998	
HIVCC	0.958	0.970	0.953	0.980	0.981

SAMPLE STATISTICS

ESTIMATED SAMPLE STATISTICS

Means

ADEQADL	ADEQEMOT	CESD01	CESD05	CESD06
3.053	2.750	0.893	1.119	1.089

Means

CESD07	CESD08	CESD10	CESD11	CESD12

	1.287	1.086	0.874	1.400	1.308

Means

	CESD14	CESD20	SLFHLTH	AGECC	HIVCC
	1.229	0.932	6.743	0.828	1.431

Covariances

	ADEQADL	ADEQEMOT	CESD01	CESD05	CESD06
ADEQADL	1.006				
ADEQEMOT	0.476	1.205			
CESD01	-0.168	-0.208	0.747		
CESD05	-0.150	-0.228	0.238	0.869	
CESD06	-0.170	-0.321	0.292	0.380	0.881
CESD07	-0.269	-0.220	0.299	0.419	0.414
CESD08	-0.167	-0.232	0.142	0.159	0.228
CESD10	-0.165	-0.249	0.251	0.307	0.427
CESD11	-0.132	-0.261	0.221	0.308	0.403
CESD12	-0.030	-0.086	0.125	0.066	0.118
CESD14	-0.205	-0.308	0.248	0.300	0.484
CESD20	-0.143	-0.207	0.247	0.303	0.414
SLFHLTH	0.467	0.285	-0.196	-0.295	-0.364
AGECC	-0.123	-0.072	0.041	0.141	0.133
HIVCC	-0.108	-0.175	0.072	0.097	0.106

Covariances

	CESD07	CESD08	CESD10	CESD11	CESD12
CESD07	1.041				
CESD08	0.103	1.106			
CESD10	0.315	0.178	0.850		
CESD11	0.308	0.065	0.358	1.057	
CESD12	0.056	0.124	0.193	0.104	1.024
CESD14	0.375	0.216	0.413	0.360	0.096
CESD20	0.383	0.113	0.341	0.383	0.086
SLFHLTH	-0.417	-0.226	-0.216	-0.248	-0.203
AGECC	0.160	0.013	0.046	0.107	0.044
HIVCC	0.054	0.059	0.045	0.143	0.035

Covariances

	CESD14	CESD20	SLFHLTH	AGECC	HIVCC
CESD14	1.074				
CESD20	0.351	0.835			
SLFHLTH	-0.223	-0.349	3.094		
AGECC	0.108	0.168	-0.432	0.825	
HIVCC	0.125	0.119	-0.340	0.224	1.214

Correlations

	ADEQADL	ADEQEMOT	CESD01	CESD05	CESD06
ADEQADL	1.000				
ADEQEMOT	0.432	1.000			
CESD01	-0.194	-0.219	1.000		
CESD05	-0.161	-0.223	0.295	1.000	
CESD06	-0.181	-0.312	0.360	0.434	1.000
CESD07	-0.263	-0.196	0.339	0.441	0.432

CESD08	-0.158	-0.201	0.157	0.162	0.231
CESD10	-0.178	-0.246	0.316	0.357	0.493
CESD11	-0.128	-0.231	0.248	0.322	0.418
CESD12	-0.029	-0.077	0.143	0.070	0.124
CESD14	-0.197	-0.270	0.277	0.310	0.498
CESD20	-0.156	-0.206	0.312	0.355	0.482
SLFHLTH	0.265	0.148	-0.129	-0.180	-0.220
AGECC	-0.135	-0.073	0.052	0.167	0.157
HIVCC	-0.097	-0.144	0.076	0.095	0.102

Correlations

	CESD07	CESD08	CESD10	CESD11	CESD12
CESD07	1.000				
CESD08	0.096	1.000			
CESD10	0.334	0.184	1.000		
CESD11	0.293	0.060	0.378	1.000	
CESD12	0.054	0.116	0.206	0.100	1.000
CESD14	0.355	0.198	0.432	0.338	0.091
CESD20	0.411	0.118	0.404	0.407	0.092
SLFHLTH	-0.232	-0.122	-0.133	-0.137	-0.114
AGECC	0.173	0.013	0.055	0.115	0.048
HIVCC	0.048	0.051	0.044	0.126	0.031

Correlations

	CESD14	CESD20	SLFHLTH	AGECC	HIVCC
CESD14	1.000				
CESD20	0.371	1.000			
SLFHLTH	-0.122	-0.217	1.000		
AGECC	0.115	0.202	-0.270	1.000	
HIVCC	0.109	0.118	-0.175	0.223	1.000

MAXIMUM LOG-LIKELIHOOD VALUE FOR THE UNRESTRICTED (H1) MODEL IS -12635.632

UNIVARIATE SAMPLE STATISTICS

UNIVARIATE HIGHER-ORDER MOMENT DESCRIPTIVE STATISTICS

Variable/ Sample Size	Mean/ Variance	Skewness/ Kurtosis	Minimum/ Maximum	% with Min/Max	Percentiles 20%/60%	40%/80%	Median
ADEQADL	3.052	-0.722	1.000	10.36%	2.000	3.000	3.000
618.000	1.004	-0.635	4.000	42.56%	4.000	4.000	
ADEQEMOT	2.751	-0.293	1.000	17.54%	2.000	2.000	3.000
627.000	1.204	-1.252	4.000	33.33%	3.000	4.000	
CESD01	0.891	0.636	0.000	38.80%	0.000	1.000	1.000
634.000	0.747	-0.430	3.000	4.57%	1.000	2.000	
CESD05	1.121	0.324	0.000	30.46%	0.000	1.000	1.000

```
             627.000       0.869      -0.883       3.000    7.66%       1.000
2.000
     CESD06                1.090       0.460       0.000   31.18%       0.000
1.000      1.000
             635.000       0.882      -0.725       3.000    8.82%       1.000
2.000
     CESD07                1.290       0.221       0.000   27.27%       0.000
1.000      1.000
             627.000       1.045      -1.095       3.000   14.67%       2.000
2.000
     CESD08                1.082       0.473       0.000   39.20%       0.000
1.000      1.000
             625.000       1.105      -1.063       3.000   12.32%       1.000
2.000
     CESD10                0.868       0.797       0.000   42.95%       0.000
0.000      1.000
             631.000       0.850      -0.307       3.000    6.97%       1.000
2.000
     CESD11                1.393       0.173       0.000   22.45%       0.000
1.000      1.000
             628.000       1.054      -1.101       3.000   18.31%       2.000
2.000
     CESD12                1.308       0.183       0.000   26.23%       0.000
1.000      1.000
             629.000       1.024      -1.085       3.000   14.31%       2.000
2.000
     CESD14                1.223       0.314       0.000   30.77%       0.000
1.000      1.000
             624.000       1.074      -1.091       3.000   14.26%       1.000
2.000
     CESD20                0.934       0.627       0.000   39.02%       0.000
1.000      1.000
             633.000       0.836      -0.562       3.000    6.32%       1.000
2.000
     SLFHLTH               6.755      -0.266       1.000    0.48%       5.000
6.000      7.000
             620.000       3.101      -0.280      10.000    5.65%       7.000
8.000
     AGECC                 0.828       0.960       0.000   44.44%       0.000
0.000      1.000
             639.000       0.825       0.395       4.000    0.78%       1.000
2.000
     HIVCC                 1.433       0.506       0.000   21.82%       0.000
1.000      1.000
             628.000       1.214      -0.332       5.000    0.32%       2.000
2.000


THE MODEL ESTIMATION TERMINATED NORMALLY


MODEL FIT INFORMATION

Number of Free Parameters                       55

Loglikelihood

          H0 Value                     -12711.356
          H1 Value                     -12635.632

Information Criteria
```

Akaike (AIC)	25532.712
Bayesian (BIC)	25778.093
Sample-Size Adjusted BIC (n* = (n + 2) / 24)	25603.471

Chi-Square Test of Model Fit

Value	151.448	
Degrees of Freedom	80	
P-Value	0.0000	

RMSEA (Root Mean Square Error Of Approximation)

Estimate	0.037	
90 Percent C.I.	0.028	0.046
Probability RMSEA <= .05	0.990	

CFI/TLI

CFI	0.958
TLI	0.947

Chi-Square Test of Model Fit for the Baseline Model

Value	1819.050
Degrees of Freedom	102
P-Value	0.0000

SRMR (Standardized Root Mean Square Residual)

Value	0.033

MODEL RESULTS

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
CESD BY				
CESD01	1.000	0.000	999.000	999.000
CESD05	1.273	0.133	9.579	0.000
CESD06	1.676	0.156	10.770	0.000
CESD07	1.429	0.141	10.169	0.000
CESD08	0.663	0.117	5.688	0.000
CESD10	1.383	0.133	10.386	0.000
CESD11	1.331	0.149	8.907	0.000
CESD12	0.438	0.116	3.762	0.000
CESD14	1.502	0.166	9.033	0.000
CESD20	1.371	0.134	10.220	0.000
CESD ON				
HIVCC	0.012	0.016	0.764	0.445
SLFHLTH	-0.043	0.011	-3.804	0.000
AGECC	0.056	0.021	2.692	0.007
ADEQADL	-0.038	0.020	-1.933	0.053
ADEQEMOT	-0.123	0.021	-5.983	0.000
ADEQADL ON				
HIVCC	-0.036	0.036	-1.006	0.314
SLFHLTH	0.137	0.023	5.930	0.000
AGECC	-0.070	0.047	-1.482	0.138

ADEQEMOT ON				
HIVCC	-0.119	0.042	-2.842	0.004
SLFHLTH	0.077	0.027	2.887	0.004
AGECC	-0.016	0.049	-0.323	0.747
HIVCC WITH				
SLFHLTH	-0.338	0.080	-4.251	0.000
AGECC	0.223	0.043	5.206	0.000
AGECC WITH				
SLFHLTH	-0.432	0.063	-6.900	0.000
ADEQADL WITH				
ADEQEMOT	0.423	0.045	9.336	0.000
Means				
SLFHLTH	6.745	0.071	94.671	0.000
AGECC	0.828	0.036	23.308	0.000
HIVCC	1.432	0.044	32.756	0.000
Intercepts				
ADEQADL	2.238	0.184	12.187	0.000
ADEQEMOT	2.415	0.216	11.200	0.000
CESD01	1.576	0.117	13.505	0.000
CESD05	1.988	0.138	14.411	0.000
CESD06	2.235	0.162	13.772	0.000
CESD07	2.265	0.148	15.346	0.000
CESD08	1.537	0.106	14.478	0.000
CESD10	1.819	0.147	12.385	0.000
CESD11	2.309	0.138	16.783	0.000
CESD12	1.608	0.091	17.735	0.000
CESD14	2.255	0.152	14.821	0.000
CESD20	1.868	0.135	13.812	0.000
Variances				
SLFHLTH	3.094	0.163	18.956	0.000
AGECC	0.825	0.050	16.446	0.000
HIVCC	1.214	0.062	19.476	0.000
Residual Variances				
ADEQADL	0.929	0.046	20.118	0.000
ADEQEMOT	1.161	0.042	27.595	0.000
CESD01	0.566	0.035	16.309	0.000
CESD05	0.575	0.038	15.053	0.000
CESD06	0.372	0.037	10.117	0.000
CESD07	0.672	0.047	14.415	0.000
CESD08	1.026	0.052	19.767	0.000
CESD10	0.504	0.039	12.821	0.000
CESD11	0.734	0.045	16.166	0.000
CESD12	0.989	0.044	22.476	0.000
CESD14	0.665	0.047	14.165	0.000
CESD20	0.495	0.034	14.517	0.000
CESD	0.139	0.023	6.173	0.000

STANDARDIZED MODEL RESULTS

STDYX Standardization

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value

CESD BY				
CESD01	0.493	0.036	13.857	0.000
CESD05	0.582	0.036	16.088	0.000
CESD06	0.760	0.027	28.167	0.000
CESD07	0.596	0.034	17.354	0.000
CESD08	0.269	0.044	6.087	0.000
CESD10	0.639	0.032	19.760	0.000
CESD11	0.552	0.036	15.266	0.000
CESD12	0.184	0.048	3.840	0.000
CESD14	0.617	0.033	18.592	0.000
CESD20	0.639	0.031	20.876	0.000
CESD ON				
HIVCC	0.032	0.041	0.771	0.441
SLFHLTH	-0.179	0.044	-4.023	0.000
AGECC	0.120	0.045	2.664	0.008
ADEQADL	-0.090	0.046	-1.965	0.049
ADEQEMOT	-0.317	0.044	-7.187	0.000
ADEQADL ON				
HIVCC	-0.040	0.040	-1.009	0.313
SLFHLTH	0.240	0.040	5.990	0.000
AGECC	-0.063	0.042	-1.497	0.134
ADEQEMOT ON				
HIVCC	-0.120	0.042	-2.854	0.004
SLFHLTH	0.123	0.043	2.885	0.004
AGECC	-0.013	0.041	-0.324	0.746
HIVCC WITH				
SLFHLTH	-0.175	0.040	-4.361	0.000
AGECC	0.223	0.039	5.754	0.000
AGECC WITH				
SLFHLTH	-0.271	0.036	-7.607	0.000
ADEQADL WITH				
ADEQEMOT	0.407	0.038	10.620	0.000
Means				
SLFHLTH	3.835	0.117	32.663	0.000
AGECC	0.912	0.031	29.477	0.000
HIVCC	1.299	0.041	32.001	0.000
Intercepts				
ADEQADL	2.233	0.201	11.106	0.000
ADEQEMOT	2.200	0.203	10.817	0.000
CESD01	1.823	0.127	14.308	0.000
CESD05	2.133	0.140	15.210	0.000
CESD06	2.380	0.164	14.492	0.000
CESD07	2.219	0.139	15.963	0.000
CESD08	1.461	0.101	14.509	0.000
CESD10	1.972	0.145	13.633	0.000
CESD11	2.248	0.131	17.176	0.000
CESD12	1.589	0.094	16.969	0.000
CESD14	2.175	0.140	15.487	0.000
CESD20	2.044	0.140	14.640	0.000
Variances				
SLFHLTH	1.000	0.000	*********	0.000
AGECC	1.000	0.000	*********	0.000
HIVCC	1.000	0.000	*********	0.000

Residual Variances				
ADEQADL	0.924	0.021	43.081	0.000
ADEQEMOT	0.964	0.015	64.347	0.000
CESD01	0.757	0.035	21.716	0.000
CESD05	0.662	0.042	15.821	0.000
CESD06	0.422	0.041	10.309	0.000
CESD07	0.645	0.041	15.767	0.000
CESD08	0.928	0.024	38.935	0.000
CESD10	0.592	0.041	14.415	0.000
CESD11	0.696	0.040	17.495	0.000
CESD12	0.966	0.018	53.930	0.000
CESD14	0.619	0.041	15.139	0.000
CESD20	0.592	0.039	15.196	0.000
CESD	0.767	0.036	21.556	0.000

R-SQUARE

Observed Variable	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
ADEQADL	0.076	0.021	3.543	0.000
ADEQEMOT	0.036	0.015	2.425	0.015
CESD01	0.243	0.035	6.963	0.000
CESD05	0.338	0.042	8.087	0.000
CESD06	0.578	0.041	14.131	0.000
CESD07	0.355	0.041	8.692	0.000
CESD08	0.072	0.024	3.027	0.002
CESD10	0.408	0.041	9.925	0.000
CESD11	0.304	0.040	7.659	0.000
CESD12	0.034	0.018	1.895	0.058
CESD14	0.381	0.041	9.312	0.000
CESD20	0.408	0.039	10.472	0.000

Latent Variable	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
CESD	0.233	0.036	6.551	0.000

TOTAL, TOTAL INDIRECT, SPECIFIC INDIRECT, AND DIRECT EFFECTS

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Effects from HIVCC to CESD				
Sum of indirect	0.016	0.007	2.403	0.016
Specific indirect				
CESD ADEQADL HIVCC	0.001	0.002	0.786	0.432
CESD ADEQEMOT HIVCC	0.015	0.006	2.455	0.014
Effects from SLFHLTH to CESD				

Sum of indirect	-0.015	0.005	-3.191	0.001
Specific indirect				
CESD ADEQADL SLFHLTH	-0.005	0.003	-1.839	0.066
CESD ADEQEMOT SLFHLTH	-0.009	0.004	-2.538	0.011

Effects from AGECC to CESD

Sum of indirect	0.005	0.007	0.634	0.526
Specific indirect				
CESD ADEQADL AGECC	0.003	0.002	1.086	0.277
CESD ADEQEMOT AGECC	0.002	0.006	0.317	0.751

STANDARDIZED TOTAL, TOTAL INDIRECT, SPECIFIC INDIRECT, AND DIRECT EFFECTS

STDYX Standardization

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Effects from HIVCC to CESD				
Sum of indirect	0.042	0.016	2.534	0.011
Specific indirect				
CESD ADEQADL HIVCC	0.004	0.005	0.795	0.427
CESD ADEQEMOT HIVCC	0.038	0.015	2.595	0.009
Effects from SLFHLTH to CESD				
Sum of indirect	-0.061	0.018	-3.361	0.001
Specific indirect				
CESD ADEQADL SLFHLTH	-0.022	0.012	-1.877	0.061
CESD				

```
    ADEQEMOT
    SLFHLTH           -0.039      0.015     -2.630      0.009


Effects from AGECC to CESD

  Sum of indirect      0.010      0.015      0.640      0.522

  Specific indirect

    CESD
    ADEQADL
    AGECC              0.006      0.005      1.097      0.273

    CESD
    ADEQEMOT
    AGECC              0.004      0.013      0.320      0.749



     Beginning Time:  09:25:10
        Ending Time:  09:29:10
       Elapsed Time:  00:04:00


MUTHEN & MUTHEN
3463 Stoner Ave.
Los Angeles, CA  90066

Tel: (310) 391-9971
Fax: (310) 391-8971
Web: www.StatModel.com
Support: Support@StatModel.com

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