VALIDATING THE CENTER FOR EPIDEMIOLOGICAL STUDIES DEPRESSION SCALE (CES-D) FOR USE AMONG OLDER ADULTS IN NEPAL

By

SUJAN LAL SHRESTHA

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OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
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Sujan Lal Shrestha

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Chair: Tanya Koropeckyj-Cox
Cochair: Amy Pienta
Major Department: Sociology

The aim of this study is to examine the validity of the Center for Epidemiologic Studies Depression Scale (CES-D) for use in Nepal and to examine the prevalence of depressive symptomatology and associated factors among a convenience sample of older adults living in the Chitwan Valley region of Nepal. Study participants included 96 people aged 55 years and older interviewed in 1998. Depressive symptoms were measured by respondent's score on a modified 10-item CES-D scale translated to Nepalese and derived from the original 20-item CES-D scale. The reliability and factor structure of the short-form CES-D scale were examined using principal-components factor analysis. The relationships among age, sex, self-rated health, activities of daily limitation (ADL), and depression were also examined. Principal-components factor analysis revealed two independent factors of depressive symptoms, related to "depressed mood" (negative affect) and "feeling well" (both positive affect and somatic symptoms). Together, the feeling well and negative affect factors accounted for 54.2 percent of the

total variance. Cronbach's alpha indicated satisfactory reliability for seven items together (.72). Principal-component analysis led to the conclusion that the items "did you feel lonely," "did you feel interested in things," and "did you feel that you could 'get going'" did not correlate well with the other items and CES-D scale. Higher CES-D scores were significantly associated with being young-old versus old-old, having more limitations with activities of daily living (ADL), and having poorer self-rated health. The relationship between CES-D and self-rated health was no longer statistically significant after controlling for demographic factors and ADL limitations. Interestingly, the somatic items -- "everything you did was an effort," "sleep well," and "a lot of energy" -- were more highly correlated with positive affect than with negative affect measures, which may reflect the positive orientation in the Nepalese translation. Unexpected findings were the link between depression and younger age and the lack of statistically significant relation between sex and depression; further investigation is needed to better understand the measurement and occurrence of depressive symptoms among older adults in Nepal.

CHAPTER 1
INTRODUCTION

Declining fertility and improvements in health status and longevity suggest that the aging population will continue to increase in the poorest countries of Asia and Africa. Over the last several decades, many of the poorest countries in the world have undergone substantial economic growth and great changes in social conditions. With the fall of infant and child mortality rates and increase in adult survival, noncommunicable diseases have emerged as important causes of death associated with aging in the poorest regions of the world (Murray & Lopez, 1996). Together, these changes will likely have consequences for the mental health of the elderly living in Asia and other regions that are undergoing rapid social change. Therefore, there is growing recognition of the importance of mental health problems in developing countries (Murray & Lopez, 1996). Murray and Lopez (1996) report in their study, Global Burden of Disease, that mental disorders are among the most serious in the world, and their burden will increase over the next decades.

In Nepal, mental health is a largely neglected because of social stigma, inadequate infrastructure resources including as personnel and health facilities, and a virtual absence of formal mental health services in rural areas, where the vast majority of the population live. In addition, there has been very little research in Nepal directed at understanding mental health issues. Under these circumstances, it will be helpful to first examine the

validity of the depression scale and to document the impact of the mental disorder on age, gender and physical disability.

While global population aging has led to new research activities throughout the world, there are many countries, including Nepal, for which only limited health and aging data are available. We know little about mental health and do not have equivalent measures for research in Nepal as well as other Asian countries. Mental health problems go undetected in Nepal, therefore we know very little about mental health status of the elderly. The purpose of this study is to (1) to evaluate the validity of a Nepalese version of the CES-D scale for measuring depressive symptoms among older adults in Nepal; and (2) to describe overall mental health status of a sample of older Nepalese. Specifically, I examine data from the Chitwan Valley Family Study of Nepal. The current study addresses the following specific research questions:

1. Are underlying factors of the 10- Item CES-D scale relevant and significant in a Nepalese older adult population?
2. How are age, gender, and health factors related to depressive symptoms among older adults in the Nepalese context?

CHAPTER 2
BACKGROUND

Depression has been defined as an unpleasant feeling of sadness and/or dejection marked by difficulties in sleeping, concentrating and acting (Turner et al., 1995). Depression often arises from stress and strain, making it an excellent indicator of well being (Turner et al., 1995). Depression is probably the single most studied aspect of mental health, and it has practical, clinical, and scholarly implications. Unfortunately little is known about the prevalence of depression and other indicators of mental health in poorer, rapidly changing nations such as those countries in Asia, Africa, and some parts of Latin America.

A growing number of epidemiological studies are examining the relationship between population aging and psychological well being in such nations. These studies commonly rely on self-report, standardized instruments which measure psychiatric symptomatology in non-clinical populations (Beals et al. 1991). There are numerous benefits in employing self-report, standardized instruments, as they can be easily administered to large groups, can be readily scored, and may allow for statistical comparison between ethnic population groups. A weakness of using standardized measurement, however, is in the assumption that concepts and expression of psychological disorders are uniform across cultural groups. This may be an ethnocentric assumption when considering diverse cultural groups (Marsella et al. 1985).

One of the most frequently used standardized measures of depression is the Center for Epidemiology Studies on Depression (CES-D), a self-administered instrument consisting of 20 items that is designed to measure the level of depressive symptomatology in community populations (Radloff, 1977). Although the CES-D was designed primarily to measure depression symptoms, (e.g., feel blue, feel depressed), it also measures self-esteem and social withdrawal (e.g., lonely, sad, fearful, a failure, feeling bothered, talking less, feeling that people are unfriendly, and feeling disliked).

In Radloff's (1977) original study, the CES-D was administered to African- and European-Americans in the United States. In Western samples, four factors are typically differentiated: (a) depressive mood (feeling blue, depressed, lonely, sad, fearful, a failure); (b) positive affect (happy, feeling as good as others, enjoy life, hopeful); (c) somatic symptoms (feeling bothered, losing sleep, keeping ones mind on problem, using too much effort and (d) interpersonal problems (feeling disliked, feeling that people are unfriendly) (Radloff, 1977). While Thorson and Powell (1993) obtained a five-factor solution for an adult sample, other studies have repeated Radloff's (1977) four-factor solution (Clark et al. 1981; Golding & Aneshensel 1989), including a study using a Korean version of the CES-D (Noh et al. 1992).

Several studies of culturally diverse samples have questioned the assumption of universality regarding concepts of psychological disorders, thereby challenging the validity of using standardized measures among non-Western populations. For example, research findings on depressive disorders suggest that non-western groups may report more somatic symptoms than Western groups (Marsella et al., 1985). The importance of the somatic component has also been found among the Chinese (Cheung, 1986;

Kleinman & Kleinman, 1985), Filipinos (Crittenden et al., 1992) and Vietnamese (Flaskerud and Soldevilla 1986). Researchers have established that the CES-D has acceptable validity for use with Nepalese adult samples (Tausig et al., 2003) as well as Korean and Chinese samples (Lin, 1989), although significant variations have been found in the psychometric properties of the translated scale. Factor analysis results for Chinese and Japanese American adults obtained a three factor solution in which depressive mood and somatic symptoms were combined in a single factor (Kuo 1984; Ying 1988). Factor analyses for Korean and Filipino Americans in Kuo's (1984) study also supported a strong relation between depressed mood and somatic symptoms and found only two unique factors. However, no study has reported the construct validity of the CES-D in Nepal for use with the older adult population.

Nepal is a densely populated, landlocked, Himalayan nation located between India and China with a total population size of around 24 million (CBS, Nepal, 2001). Population aging, typically accelerated by declining birth rates and declining mortality, has just begun in Nepal. Currently only 3.5 percent of the population is over the age of 65 (U.S Bureau of the Census, 2000). Only 4 percent of the population lives in urban areas and farming is the major occupation. Just over 38 percent of the population is literate, and most (56.6 percent) are economically active. Although there is no universal public pension in Nepal, older adults (age 65+) are less likely to be economically active than the general population though 26% of elderly are economically active.

Nepal is one of the world's most economically depressed nations and is a non-Western, very traditional society (Watkins, Regmi, & Alfon, 1989). Nonetheless, there has been a push in Nepal toward greater economic development and closer links to the

West (Pigg, 1992). It is still difficult to speculate whether such ideological and economic moves will affect the traditionalism of the Nepalese people. Because of a possible combination of Nepal's traditionalism and changing national characteristics, it is difficult to predict how Nepalese depression scores will compare to those observed in the United States, other Western nations, and other Asian nations.

The Nepalese do not typically use mental health services for the treatment of depression, and mental health professionals are used only for problems of severe psychoses. The general public's attitudes towards mental illness are fear and rejection. A mentally ill person is often considered to have been born under a "bad day" or as suffering the consequences of his/her ancestors' misdeeds in their previous lives. Mental illness brings shame on the whole family. It affects one's social status in society, and it also affects the marriage opportunities of the family members. According to a report from U.S. Department of Health and Human Services (2001), Asian people in general are reluctant to talk about mental health issues because there is disgrace associated with revealing mental health problems. Thus it may be difficult to detect depression in Nepal because of the extreme social stigma it carries. It is for this reason that measures of mental health may not translate well in the Nepalese context. There are known difficulties in applying Western diagnostic criteria or symptoms scales to both minority populations and cross culture populations (Kleinman & Good, 1985).

In summary, to establish the validity of the CES-D for use with older adults in Nepal, I conduct factor analyses is and results compared to studies described above. To further assess the validity of the sub-components and the overall measures of depression, I examine correlations among characteristics commonly associated with depression and

with the measures evolving from this analysis. Lastly, I examine the relationship between depression and health, age, and gender that have been reported in other studies.

Depression and Age

Depressive symptoms, which are more common in old age than in middle age (Kessler et al., 1992), are associated with serious negative outcomes such as increased risk of a depressive disorder (Beekman et al., 1997). Increased depressive symptoms in later life are associated with high rates of illness and disability among older people (Berkman et al., 1986). A recent survey conducted in Nepal finds a U-shaped profile of depression by age, with middle aged adults feeling less depressed than younger and older adults, and CES-D depression symptoms increasing with old age (Tausig et al., 2003). Somatic symptoms, such as sleep or appetite disturbances and reduced energy can be expected to increase as a result of depression, illness or both. Somatic symptoms alone however, do not account for increased depression among the elderly. Rather both depressive symptoms and somatic symptoms have been found to increase with advancing age (Kessler et al., 1992). Many somatic symptoms of depression are also commonly found in nondepressed older individuals who are physically ill. Thus, the association between increasing age and depression has been shown inconsistently in the literature. A pan-European study found only a modest association between increasing age and depressive symptoms after the age of 65 (Prince et al., 1999), though a community study demonstrated an association between age and depressive symptoms after controlling for a number of socio-economic and health related variables (Blazer et al., 1991). Therefore, I expect that increased age and greater depressive symptoms will be correlated and depression will be more prevalent among older adults in Nepal.

Depression and Gender

Studies of depression in later life have also shown that depression is more common among women than men (Kennedy et al., 1989). Several studies have found clear gender differences in the prevalence of depressive disorders (Meltzer et al., 1995) with women being much more likely to report depressive symptoms than men. Across many nations, cultures, and ethnic groups, women typically encounter as much as twice the levels of depression as compared to men (Nolen-Hoeksema, 1987). Furthermore, several studies have indicated that females tend to score higher on levels of depressive symptoms (Kessler et al., 1994; McGrath et al., 1990). The evidence suggests that differences in rates of depression are largely a consequence of difference in the performance of roles. Many studies suggest that family, marital, and other interpersonal factors serve as a primary basis for these differences (Vanfossen, 1981; Billings & Moos, 1984). Furthermore, Nolen-Hoeksema (2001) offers the explanation that women have less power and status than men in most societies; they experience certain traumas and also experience lack of respect and constrained choices.

In Nepal, I expect that the disadvantaged social position of women and its consequences for their physical and mental health would also be reflected in higher rates of depressive symptoms among older Nepalese women. Women's overall health status is very poor as reflected in their lower life expectancy than men's, partly due to experiencing one of the highest maternal mortality rates in the World (Country by Country: Nepal, 1996). Women's poor health is influenced by social factors such as low level of education and illiteracy, heavy work burdens, early marriage, and high fertility. Women's inequality further increases exposure to risks, such as social and physical violence, and also affects their power to manage their own lives, to cope with such risks,

and thus, to influence their own health. A previous study in Nepal, however, from Tausig et al. (2003) found that being female is not related to higher levels of depression; the current study tests whether the relationship between depression and gender is found specifically among older adults.

Depression and Physical Disability

Finally, many cross-sectional studies have confirmed that depressed older persons have more physical disabilities than their non-depressed peers (Broadhead et al., 1990; Wells et al. 1989). Several longitudinal studies have also found evidence for a negative effect of depression on physical disability over time (Turner, & Noh, 1988; Gallo et al., 1997). The psychiatric and medical literatures abound in evidence of the high prevalence of depression among individuals with physical health problems (Green & Austin, 1993; Fielding, 1991; Wells et al., 1991). A review of studies indicates that individuals who suffer from chronic illness, particularly illness that obstructs their daily functioning, are especially susceptible to problems with depression and this relationship has been reported across cultures (Ormel et al., 1994). The *Mental Illness and Disability among Elder in Developing Countries: the Case of Nepal,* Subedi and colleagues (2004) also found that higher rates of disability are associated with depression. Thus, it is hypothesized that physical health and depression will be highly related in Nepal as well.

CHAPTER 3
METHODS

Data for this study were obtained from a convenience sample of older adults living in the Chitwan Valley of Nepal. The Western Chitwan Valley in South-Central Nepal is a wide flat valley situated in the Himalayan foothills at approximately 450 feet above sea level. The majority of people in this study area are farmers whose domestic economy is based on agricultural production. Chitwan is about 150 miles south of the capital city of Kathmandu. The research team began collecting data in the Fall of 1998. The overall goal of the pilot data collection efforts was to gather information about mental and physical health among older adults in Nepal in order to establish validity for a set of measures of mental and physical health measures. Following successful strategies used by William Axinn's research team in the same study area, a set of measures that were meaningful for a previously unstudied population of older adults was selected using a combination of ethnographic field research methods and semi-structured interviews with older adults living in the Chitwan Valley of Nepal (see Axinn, Pearce, & Dirgh, 1999). From these data, the research team was able to identify salient dimensions of mental and physical health for the daily living of the elderly living in the Chitwan Valley. The survey interview obtained demographic, psychological functioning, physical functioning, self related health, and chronic disease conditions from those people aged 55 and above. Each item in the questionnaire was translated into Nepali and then retranslated into English to ensure accuracy. The translation was done by both U.S. and Nepali researchers who were

well-trained in both languages. Individual interviews were conducted through face-to-face surveys with 96 older adults residing in the Chitwan Valley. Respondents were selected using a convenience sampling with older adults aged 55 and older.

Measurement of Depression

The Center for Epidemiology Studies of Depression (CES-D) scale was translated and adapted to measure depressive symptoms. Radloff (1977) discusses in detail the properties of the scale and its appropriateness for use with community residence adults. Depressive symptoms were measured in the Nepalese sample by the respondent's score on a 10-item scale that was derived from the original 20-items of the CES-D. A shortened 10-item CES-D was used and is composed of four negatively and six positively worded items. The participants were asked about 10 depressive symptoms that they might have experienced in the seven-day period preceding the interview. Each item references whether feelings such as loneliness and happiness have occurred, with responses coded dichotomously for "yes = 1" having a symptom or "no = 0" if they have not. Specifically, the respondents were asked to rate the following: Much of the time during past week did you. (1) feel depressed, (2) feel that everything you did was an effort much of time, (3) sleep well, (4) happy, (5) feel lonely, (6) feel interested in things, (7) enjoy life, (8) feel sad, (9) feel that you could "get going," and (10) have a lot of energy. Items worded positively (sleep well, happy, feel interesting things, get going, and lot of energy) were reverse coded before analysis, so that higher scores indicated higher depressive symptoms (See Table 2). The scores were then summed to obtain total scores ranging from 0 to 10. The score indicates the total number of symptoms reported for the past week. The internal consistency coefficients for the summed, 10-item CES-D scale are satisfactory, with a reliability coefficient of .65.

Measurement of Chronic Disease Status

A measure of chronic disease status was also developed. Respondents were first asked whether they had ever been to a doctor. Of the 96 respondents, only 87 respondents had visited a doctor in their lifetime. Of those reporting they had been to a doctor, they were then asked "Has a doctor ever told you that you have… hypertension, diabetes, stroke, or heart disease… yes or no?" The total number of chronic diseases was summed into a single index of comorbidity.

Measurement of Self-Rated Health

Respondents were asked to rate their health in general on a five-point Likert scale. They were asked, "Overall, would you say your health is excellent, very good, good, fair, or poor?" This item is included as a measure of self-rated health in our analyses. Self-rated health is treated as a dichotomous variable, in the analyses: (1) good health equal to excellent, very good and good, and (0) poor health equal to fair and poor.

Measurement of Functional Limitations

Physical functioning was measured through a variety of function-specific indicators referencing limitations of lower body mobility, large muscle strength, upper body mobility, and the activities of daily living. Lower body mobility problems refer to any difficulty walking (across the room, a block, or a mile) or difficulty climbing stairs (one or several flights). Any reported difficulty with reaching arms above the head, picking up a dime from a table, or lifting a heavy object (10-pound bag of groceries) is defined as an upper body mobility limitation. Large muscle strength problems reference any difficulty sitting for a length of time, rising from a sitting position, or kneeling, stooping, and pushing/pulling large objects. Finally, persons who report any difficulty with one or more

of the following items-- eating, bathing, dressing, or getting in and out of the bed-- are classified as having activities of daily living limitation.

The total number of activities of daily living (ADL) limitations was summed to obtain a score for each individual, based on responses to the following questions: do you have any problem (1) eating without help, (2) bathing without help, (3) dressing without help, and (4) getting in and out of the bed without help? Responses were recorded as "yes = 1" having any difficulty or "no = 0."

Measurement of Sociodemographic Characteristics

Age is measured in years from two questions asking respondents to report their age or the year they were born. Gender is constructed based on the interviewer's observation and coded male (=0) or female (=1).

Analytic Plan

A factor analysis of the items from the CES-D is conducted to explore the psychometric properties of the translated depression measure and to examine relationships with other key variables. Bivariate analyses include examining the zero-order correlations between the sub-components and summary measures of depressive symptoms and other variables, including age, gender, and measures of health. Other bivariate analyses include means comparisons of the sub-components and total depression index as they related to gender, age, and health status, with the t-test for statistical significance is calculated. Finally, OLS regression models including all of the independent variables (age, gender, and health) are estimated for each of the sub-components and the overall indicator of depression.

CHAPTER 4
RESULTS

Sociodemographic statistics are presented in Table 1 for the sample of older Nepalese living in Chitwan Valley. The sample ranged in age from 55 to 87 with a mean age of 66. Just less than half of the sample was comprised of women (46.1%). Also, reported in Table 1 are indicators of the overall health of the sample. Out of the 96 respondents, only 87 respondents had ever visited a doctor. Those who had visited a doctor were asked a series of questions to elicit the prevalence of doctor-diagnosed health problems. Heart disease and hypertension were the most common chronic disease conditions with 30.1% and 22.9 % of elderly reporting they had been diagnosed as having heart disease or hypertension, respectively. The comorbidity index, constructed from these disease status indicators by summing the number of reported chronic conditions, exhibited a range of 0 to 3 conditions among the elderly adults in sample. On average, respondents reported having about one chronic illness (0.6, SD = 0.8). More than 55 percent (55.8%) of elderly people reported they had one of the difficulties with activities of daily living (ADL). An index of the severity of ADL limitation was constructed based on any reported difficulty with one or more of the following items- eating, bathing, dressing, or getting in and out of the bed. The summed number of reported ADL limitation conditions exhibited a range of 0 to 7 limitations among the elderly adults in sample. On average, respondents reported having about two ADL limitations (1.8, SD = 2.2).

Table 1: Descriptive Sample Characteristics of Older Adults Living in the Chitwan Valley (n=96)

		S.D	min	max	n
Demographic Characteristics					
Age (mean in years)	66.0	7.7	55	87	96
Female (%)	46.1				96
Physical Functioning					
Any ADL Limitations (%)	55.8				96
Severity of ADL Limitation (mean)	1.8	2.2	0	7	96
Self-Rated Health					
Excellent (%)	4.9				96
Very Good (%)	2.9				96
Good (%)	29.1				96
Fair (%)	50.5				96
Poor (%)	12.6				96
Chronic Disease Status [A]					
Hypertension (%)	22.9				83
Heart Disease (%)	30.1				83
Stroke (%)	9.2				87
Comorbidity Index (mean # condition)	0.6	0.8	0	3	78

[A] Calculated for those who have visited a doctor (n=87), with a series of questions that asked…have you ever been examined by a health professional such as doctor or a nurse?

Self-rated health indicates an individual's view of his or her general health status. Only 12.6% of adults over the age of 55 rated their health as poor. However, only 4.9% reported their health as excellent. Functional limitations were also frequently reported among the elderly of the sample.

Characteristics of the CES-D Scale

Table 2 shows the frequency of CES-D symptoms. The most commonly reported symptoms were feeling that everything they did was an effort (70.8%) and feeling

depressed (63.5%). About half of the respondents reported feeling sad (54.2%), feeling interested in things (51%), or that they could get going (50%).

Table 2: Percentage and Mean number of Symptoms for CES-D Scale of Older Adults Living in the Chitwan Valley (n=96)

Short-form CES-D Scale Items	Percentage Reporting "Yes"
Everything effort	70.2
Felt depressed	63.5
Feel sad	54.2
Feel interesting in things	51.0
Get going	50.0
Enjoy life	45.8
Feel lonely	42.7
Happy	40.6
Sleep well	39.6
A lot of energy	39.6
CES-D All 10 items (mean #symptoms):	
Mean	4.98
Standard Deviation	2.4
Minimum	0
Maximum	10

Depressive symptoms were measured as dichotomous responses (1 = yes, 0 = no) to the following questions, referring to the past week:
Did you feel depressed much of the time during the past week?
Did you feel that everything you did was as effort…?
+ Did you sleep well…?
+ Were you happy…?
Did you feel lonely…?
+ Did you feel interested…?
+ Did you enjoy life…?
Did you feel sad…?
+ Did you feel that you could "get going"…?
+ Did you have a lot of energy…?

+ = Items that are reverse coded.

Looking at the other symptoms, 45.8 percent of older adults reported that they enjoyed life, 42.7 percent felt lonely, 40.6 percent felt happy, and 39.6 percent reported that they had a lot of energy and had slept well much of the time during the past week.

The total mean number of depressive symptoms created from these CES-D items by summing the number of reported depressive conditions, revealed a range from 0 to 10 conditions among the elderly in sample. The mean number of depressive symptoms reported was 4.98.

Properties of the Short-Form CES-D Scale

Table 3 presents data on the reliability and factor structure of the short-form (10-item) CES-D scale, based on exploratory analysis of these data, using the principal-components methods. Principal-components factor analysis supports two relatively independent factors of the CESD-7, which relate to "depressed mood" (negative affect) and "feeling well" (both positive affect and somatic symptoms). One consists of five items connected to feeling well (sleep well, enjoy life, a lot of energy, everything effort, and happy) and another factor consists of two items related to negative affect (felt depressed, and sad). Together, feeling well and negative affect factors accounted for 54.2 percent of the total variance in the sample.

For this study, using an eigenvalue greater than or equal to 1.0 indicates any factors that hold at least as much total variance as contained in a single item (Kim & Mueller, 1977). A factor loading of 0.40 was used to retain an item in a factor, even though in exploratory analysis, after factors are rotated, loadings of 0.30 or higher are generally acceptable. This study revealed that both the feeling well and negative affect factors have eigenvalues greater than 1.0, with eigenvalues of 2.697 and 1.095, respectively. Both feeling well and negative affect items were found to have higher than the minimum of a 0.40 factor loading.

Table 3: Scale Properties of the short-form CES-D Scale of Older Adults Living in the Chitwan Valley (n=96)

Patterns of Factor Loadings:	Feeling Well	Negative Affect
Sleep Well	.75	
Enjoy Life	.70	
A Lot of Energy	.69	
Everything Effort	.58	
Happy	.56	
(Eigenvalue = 2.697)		
Felt Depressed		.81
Feel Sad		.70
(Eigenvalue = 1.095)		
Reliability (Cronbach's alpha):		
CESD-10 items .65		
CES-D 7 items: .72		
Positive affect (5 items): .73		
Negative affect: (2 items): .41		

*Note: The 3 items that do not load into factors.

Several studies have used factor analysis to develop CES-D subscales (Clark et al., 1981; Liang et al., 1989). Based on the exploratory factor analyses, two factors interpreted as feeling well and negative or depressed mood are constructed by summing CES-D items to each of two subscales retained by the factor analysis (shown in Table 3). The two sub-factors were also summed to create a single measure of CES-D using the underlying 7-items that were retained by the factor analysis. Cronbach's alpha measures indicate satisfactory reliability for the 7-item scores (.72) and for feeling well (.73). Reliabilities were higher for the feeling well (.73) subscale than for the negative affect subscale (.41). Many previous studies indicated that the Cronbach's alpha scores of the short form CES-D scale are expected to be lower than the full scale.

Principal-component factor analysis showed that the items "did you feel lonely," "did you feel interested in things," and "did you feel that you could 'get going'" were not correlated well with other CES-D items and scale. Deleting items that did not load clearly substantially improved subscale reliabilities; therefore these three items were dropped from further analysis and only seven of the ten items were used in subsequent analyses.

Correlates of Depression Scale

Table 4 present correlations between all CES-D measures (CESD-7-item, feeling well and negative affect) and independent variables. Age is correlated with activities of daily living limitation and is statistically significant at the 0.01 level. CESD-7 score and negative affect score were statistically significantly and negatively correlated with age. Sex was not significantly associated with any of the CES-D scores.

Table 4: Bivariate Correlation between the CES-D7 and Age, Sex, Activities of Daily Living (ADL), Self-Rated Health, Positive Affect (CES-D5), and Negative Affect (CES-D2) of Older Adults Living in Chitwan (n=96)

	AGE	SEX	ADL	HLTH	DEP7	DEP5
SEX	-.135					
ADL	.326**	.161				
HLTH	.008	-.142	.128			
DEP7	-.210*	-.096	.355**	.216*		
DEP5	-.165	-.062	.353**	.260*	.938**	
DEP2	-.207*	-.126	.190	.021	.660**	.358**

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2 –tailed).
ADL = Activities of Daily Activities Limitation
HLTH = Self-rated Health
DEP7 = Short-form Depression Scale (Total)
DEP5 = Positive Affect
DEP2 = Negative Affect

Activities of daily living limitations and self-rated health were statistically significantly and positively correlated with CES-D scores (CESD-7, and feeling well). The CESD-7 scores were statistically significantly and positively correlated with both the

feeling well and negative affect depression subscales. Finally, feeling well is also statistically significantly and positively correlated with the negative affect depression score.

Mean Score of CES-D

The mean scores for the CESD-7, feeling well and negative affect are presented by gender, age and self-rated health in Table 5. Though other studies have found that women usually report higher depression, the opposite appears to be true in this pilot sample. For all three CES-D measures, men reported higher CES-D mean scores than women, but these differences were not statistically significant. Normally, older persons have higher CES-D scores than younger persons, but this study finds a relationship in the opposite direction. Overall, the CESD-7 and negative affect scores are higher among the young old (4.0 and 1.3, respectively) than the old old (3.1 and 1.0). These differences are statistically significant. The young old also report higher levels of feeling well than the old old (2.7 and 2.1 respectively), but this is not a statistically significant difference.

The self-rated health differences in average depression scores are statistically significant with CES-D (7-item) and feeling well. In other research, poorer health is associated with higher CES-D scores. The current analyses also find such a relationship with the 7-item CES-D and the feeling well subscale, with mean scores for the CES-D- 7 of 2.9 for those in good health and 3.9 for those with poor health, and mean scores for feeling well-being of 1.8 for those in good health and 2.7 for those older adults in poor health. However, there is no statistically significant relationship between negative affect score (2 items) and self-rated health; respondents with poorer health reported only slightly higher negative affect (1.2) compared to those in good health (1.1).

Table 5: Mean number of Depressive Symptoms by Gender, Age, and Self-Rated Health of Older Adults Living in Chitwan (n=96)

	Mean	P-value
CES-D (mean # symptoms)		
Total	3.5	
Gender		
Female	3.3	p-value = 0.357
Male	3.7	
Age		
Young old (55-65)	4.0	p-value = 0.042*
Old old (66-87)	3.1	
Self-Rated Health		
Good (Excellent, very good, good)	2.9	p-value = 0.036*
Poor (fair, poor)	3.9	
Positive Affect (mean # symptoms)		
Total	2.4	
Gender		
Female	2.2	p-value = 0.555
Male	2.4	
Age		
Young old (55-65)	2.7	p-value = 0.111
Old old (65-87)	2.1	
Self-Rated Health		
Good (Excellent, very good, good)	1.8	p-value = 0.011*
Poor (fair, poor)	2.7	
Negative Affect (mean # symptoms)		
Total	1.2	
Gender		
Female	1.0	p-value = 0.228
Male	1.2	
Age		
Young old (55-65)	1.3	p-value = 0.045*
Old old (66-87)	1.0	
Self-Rated Health		
Good (Excellent, very good, good)	1.1	p-value = 0.822
Poor (Fair, poor)	1.2	

* P-value = <.05

OLS Regressions of Depression Scale

Table 6 includes the results from four different OLS regres5 sion models that analyzed the effects of age, sex, activities of daily living limitations (ADL), and self-rated health on each of the four depression measures (10-item, 7-item, feeling well, and negative affect). The first model indicates that there are significant relationships between depression (10-item) and age, sex, activities of daily limitation, and self-rated health, explaining 25 percent of the variability in depression.

Looking at the relationship between age and depression (CESD-10), the value of p is less than 0.05, which is statistically significant. This result indicates that the young old are more depressed than the old old after controlling for gender, activities of daily living limitations, and self-rated health. There is also a positive relationship between activities of daily living limitations and depression (10-item), statistically significant at the 0.001 level. As would be expected, higher rates of activities of daily living limitation are related to higher levels of depression among the older people.

The second model indicates that there are significant relationships between depression (7-item) and age, gender, activities of daily limitation, and self-rated health. The F-value is higher than the previous model, 8.028, and the R-square is increased to 0.27. Again, the relationship between age and depression (CESD-7) is statistically significant after controlling for gender, activities of daily living limitations and self-rated health. Old old adults report less depression even after other factors are controlled. A positive relationship between activities of daily living limitation and depression (7-item) is also found ($p<.001$). As one might expect, higher depressive symptoms were reported by those with poorer performance of activities of daily living.

Table 6: OLS Regression Models of Greater Depressive Symptoms (CES-10, CES-D7, CES-D5, and CES-D2) for Older Adults Living in Chitwan (n=96)

Variable	CES-D10	CES-D7	CES-D5	CES-D2
Age	-.258* (.472)	-.340* (.403)	-.302* (.021)	-.262* (.163)
Gender (female=1)	-.072 (.466)	-.100 (.398)	-.056 (.323)	-.149 (.161)
ADL Limitations	.490** (.063)	.470** (.053)	.445** (.043)	.303** (.022)
Self-rated Health	.116 (.476)	.120 (.408)	.171 (.332)	-.045 (.165)
Intercept	1.202	0.248	-0.278	0.526
R-squared	.254	.270	.253	.125
F	7.397	8.028	7.379	3.095
P	<.0001	<.0001	<.0001	<.05

CES-D10 = Short Form Center for Epidemiologic Studies-Depression Scale.
CES-D7 = 7-item CES-D Scale
CES-D5 = Positive affect
CES-D2 = Negative affect
*P <.05; **P <.001

The third and fourth models also indicate that there are significant relationships between the depression subscales (feeling well and negative affect) and age, sex, activities of daily limitation, and self-rated health. The F-values, 7.379 and 3.095, are somewhat lower but still statistically significant (p<0.0001 and <.05, respectively). The R-squares are 0.253 and 0.125, with less variability explained in the 2-item subscale of negative affect.

Age is significantly related to both feeling well and negative affect. There is also positive and significant correlation between activities of daily living limitation and the two factors of depression, feeling well and negative affect. The direction of these effects is the same as in the above models.

Looking at all four models, there is no statistically significant relationship between sex and depression after controlling for the other variables. There is also no statistically significant relationship between self-rated health and depression once age, sex, and activities of daily living limitations are controlled for in the models. Recall that before controlling for age, sex, and activities of daily living limitations, there were statistically significantly and positively relationships between self-rated health and depression (CESD-7, and positive affect).

CHAPTER 5
DISCUSSION

The need for culturally appropriate depression measures has been widely recognized in the literature whenever researchers study individuals from population where English is not their primary language. Unfortunately, most depression instruments have been developed and tested with populations in more highly developed nations. The development of culturally appropriate depression measures is important in developing countries because it would provide an instrument that would permit comparisons across societies. The goal of this study was to conduct an exploratory factor analysis in an attempt to define the reliability of the CES-D in a sample of older adults living in Chitwan Valley, Nepal. Exploratory factor analysis revealed two relatively independent factors of the CESD-7, which were related to depressed mood (negative affect) and feeling well (positive affect and somatic symptom). A similar two-factor model (positive and negative affect) was identified in previous research using the short-form CES-D scale in a Chinese population (Boey, 1999).

The CES-D short-form has satisfactory reliability for this study although only 7-items were retained. The reliability of the CES-D in this study compares favorably to those found for the AHEAD samples (Asset and Health Dynamics among the Oldest Old) by Mills and Henretta (2001) as well as by Boey (1999) for the mental health status of old old in Hong Kong. The “feeling well” sub-scale also has satisfactory reliability for this study. However, the negative affect sub-scale with only two items has a Cronbach’s

alpha of only 0.41. It is interesting to note that the items “everything you did was an effort,” “sleep well,” and “a lot of energy” were found in the feeling well depression category. This result was consistent with Edman et al. (1999), which reported that the “everything you did was an effort” item loaded on positive affect factors where effort may be viewed as a positive purpose.

Cross-cultural studies of depression among Asian populations have emphasized an Asian tendency for depressive mood and somatic symptoms to combine in a single factor (Kuo 1984; Ying 1988). The current results, however, do not support a strong connection between depressive mood and somatic symptoms. This apparent contradiction may be a result of the translation of original CES-D measures into Nepali. Two of the translated somatic symptoms -- sleep well and have a lot of energy -- are translated for this study as positively phrased questions during the interview. A literal translation from the original CES-D measures into Nepali is difficult; respondents might have understood retaining the original negative orientation of these items differently if translation were available. For example, there is no exact Nepalese word for restless sleep. It would be very difficult, especially for older people, to understand the meaning behind the exact phrase of restless sleep in Nepali. Nonetheless, the positive rewording that was chosen during the translation may have failed to capture this dimension of depression. Future research might consider alternative wordings of this question.

Principal component analysis for the short-form CESD-7 did not reveal separate somatic and interpersonal components of the original CES-D to be important in this pilot sample. Exploratory items showed that the items “did you feel lonely,” “did you feel interested in things,” and “did you feel that you could ‘get going’” did not correlate well

with other items or the CES-D scale as a whole. The lack of correlation of these three items with other items in this scale might be result of difficulty in understanding the questions in Nepalese version.

Further, in adapting a measure initially developed in a Western Society, culture-specific cautions should be taken because expression of depression in Nepalese culture may be different. As shown in the result of Nepalese sample, the item "did you feel lonely" may be somewhat problematic for this cultural comparison, because the original CES-D scale is based on the assumption that depressed persons tend to stay alone or feel isolated. However this may not necessarily be true in Nepalese culture. Where the majority of the older adults are living with their families, they are contributing to their families by helping with household tasks. Therefore, feeling lonely likely has different meaning with that in U.S. society, whose elders usually have an independent living arrangement.

The CES-D scores for the 7-items scales are highly correlated with feeling well and negative feeling, with correlation coefficients of $r = 0.94$ and $r = 0.66$, respectively. These high correlations suggest that the sub-scales are valid underlying factors of depression more generally. These validation analyses demonstrate that the seven-item short-form CES-D, which is based on the Western concept of depression, can be a reasonably valid measure of some aspects of depression among older adults in Nepal.

Finally, factor analysis further indicates that Nepalese older adults are more likely to endorse having slept well, having a lot of energy and that everything is an effort in the feeling well category, but are less likely to endorse not being able to "get going" in the feeling well category. These findings suggest that emotional expression, including

responses about somatic symptoms, may vary across different societies and cultures, thus complicating efforts to compare population mean scores of depression using scales such as the CESD.

With regard to relationships between sociodemographic characteristics and various measures of depression (CESD-7, feeling well, and negative affect), the results indicate that gender is not related to depression. This finding is not consistent with many studies on gender differences in depressive symptoms. Many studies have found higher depression scores in women than men (Kennedy et al., 1989, Kessler et al., and, 1994; McGrath et al., 1990). This finding is consistent with a recent study by Tausig and colleagues (2003) in Nepal, which reported lower depression scores or CES-D depressive symptoms in women than men. Other studies found no significant difference in depressive symptoms between genders in Nepal (Subedi et al 2004) as well as in Mexico (Aranda et al., 2001). This study's findings regarding the relationship between sex and the CES-D scale scores calls for further examination of mental health and gender in Nepal and other developing countries.

Somewhat surprisingly, the young old scored higher number of depressive means score than the old old in all three measures of depression (CESD-7, feeling well and negative affect). There is also significant relationship between depression (CESD-7, and negative affect) and age. This finding is at odds with numerous studies that have found higher depression scores among the oldest adults (Kessler et al, 1992). However, a close look at the literature reveals that when depression scores are examined across age groups, inconsistent results have been reported. In some studies the depression scores increase with age (Kessler et al., 1992; Beekman et al., 1995), in others the scores decrease

(Henderson, et al, 1998) or no age differences are found (Mirowsky & Ross, 1992). Eaton and Kessler (1981) also reported in a large community sample that individuals over age 65 show lower levels of depression than those in younger age groups. These contradictory results appear to derive from differences in the age composition of the samples studied. A study by Tausig et al. (2004) reported that there is a U-shaped profile of depression and age, with the highest depression in the young and old in Nepal. Because the present study focuses on age differences among older adults and does not compare to younger adults, this may explain the puzzling findings with regard to age. Also, mortality risk, even among older adults, is extraordinarily high in Nepal which means that those surviving to old old age may be a highly select group.

The possible explanation of the results of this study in gender may be partly attributable to the relatively small sample size. Perhaps the sample size was not large enough to detect a statistical difference in level of depressive symptoms, or there may have been a nonrandom sampling bias in this convenience sample that yielded a much different group than that found in other studies. The unexpected results in depression symptoms could reflect a sampling bias whereby women and old old adults with less depressive symptoms might be more likely to engage in an interview than men and the young old in the community. Differences in social support may be another important factor in the study of depressive symptoms in both Nepalese men and women, though it is unclear which domains or context of social support (family, relatives, occupational, income, and so forth) are predictive of depression in Nepalese men compared to women. There is substantial evidence on the relationship of social support to both physical and mental health (Dean, & Lin, 1977). Finally, this result may reflect cultural differences in

the expression of depressive symptoms in Nepalese men and women. All of these possibilities argue for closer examination of depression and gender in Nepal using random, representative samples, more sensitive and varied measures of mental health symptoms, and broader measures of other possible correlates of depression among older men and women. Furthermore, the CES-D version that we used contained only short-form CES-D items and two response categories. Despite the high correlation (r = .94) found between the short-form of CES-D modified scale, it is possible though not likely, that use of the regular version of the CES-D would have resulted in significantly higher scores and greater variation in the scores. Future research should also compare the current measures of depressive symptoms with other mental health measures, including the Diagnostic and Statistical Manual (DSM)-R-III checklist. This approach would allow for a more thorough assessment of the validity and reliability of the depression scale in Nepal and whether it's cultural and conceptual relevance in this population.

Replication of this study's results with different samples and with different scales is essential. Further research is required to determine whether the observed absence of a gender effect is an artifact of the measures and sample used here or if it is in fact real. Finally, given the differences in sub-scales according to age and self-rated health, future research of the CES-D scale might gain more accurate information by looking at the sub-scales separately when examining age and self-rated health. Kohout et al., (1993) indicated that short forms of CES-D scale have been developed to ease the response burden on older adults. Overall, this short-form of CES-D scale is important in the Nepalese context where the literacy rate is very low and where the discussion and

measurement of mental health symptoms is culturally unusual. Only 53 percent of people are literate (CBS, Nepal, 2001).

On the other hand, the abbreviated scales may miss important aspects of how mental health concerns and well-being are expressed and evaluated in this population. To fully understand the mental health of older people, first we need to identify the salient features of depression and other factors. Future studies need be done using qualitative methods to give a clearer picture of how people define depression, what they think about depression, how family members and other people think about mental health, and which factors play an important role in Nepal. Once we identify the expression of depression in Nepal, we then need to re-construct and validate a measure of depression that can be used in survey. This strategy will also guide word phrasing that will be used in questions. The assertion that mental illness represents a significant portion of the illness burden in developing countries makes it important for researchers to determine the extent of illness and the factors and causal pathways underlying difference in mental health and well-being. Such information is essential because these health problems are often ignored in large populations living in developing countries.

This study demonstrates that depression is a significant problem among older adults who have limitations in activities of daily living (ADL). This finding is consistent with many studies that found higher depression scores associated with poor performance of physical disability (Subedi et al. 2004; Gallo et al. 1997; Broadhead et al. 1990). Berkman et al. (1986) also stated that a major contributing factor to increased depressive symptoms in later life is the high prevalence of disability among older people. However, like other cross-sectional studies this study does not provide a clear causal direction--

whether poor performance of activities of daily living is a cause of depression or depression is a cause of poor performance of activities of daily living. This fundamental link and how it operates, however, calls for further examination, because as Simon et al. (1999) have noted, depressed persons have higher physical symptoms world-wide, across cultures. It is important to also note that depression was found to be unrelated to self-rated health once other demographic factors were accounted for. This result suggests that the positive, bivariate relationship between self-rated health and depression may be explained by age and activities of daily living (ADL) limitation rather than by self-rated health itself. However, concerns about the measurement of self-rated health in this survey calls for caution in interpreting the results.

In conclusion, the purpose of this study is to evaluate the validity of measures of depression (CES-D) scale and to describe an important aspect of mental health status of a sample of older Nepalese. This study is an important step in establishing the validity of the CES-D for use in detecting depression level among older adults in Nepal. It is also an important step toward determining the prevalence of physical disability and overall health status and how they are associated with higher risk of depression in the Nepalese older adult population. However, it is difficult to generalize from the present results because respondents were not randomly selected from the population. There are some additional limitations in this study. The analytic sample size is small, consisting of only 96 respondents. Future research would benefit from the use of respondents who are representative of overall sample. Additionally, it would have been ideal to have greater information about other sociodemographic characteristics of the sample that are known to correlate with psychological well-being in later life -- such as fertility history, social

support, occupation, education, living arrangement, socioeconomic status and marital status.

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BIOGRAPHICAL SKETCH

Prior to receiving his Master of Arts degree in sociology, Sujan Lal Shrestha earned his Bachelor of Arts degree in sociology at the University of Florida. Concurrent to earning his Master of Arts degree, he was a research trainee at the Institute on Aging. After completing his master's degree, Sujan began his Ph.D. coursework at the University of Florida at Gainesville in the Department of Sociology.