Poverty Measurement and Depression Symptomology in the Context of Welfare Reform

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Dedication

This dissertation is dedicated to Letha Schmitz. Though you are not here to see this project finished, you are always in my heart.

Abstract

The present study addresses current debates in the literature by examining and comparing methods used to define and measure poverty, and examining the relationship between poverty and depression symptomology. The data come from a USDA-funded, NC-233 multi-state, longitudinal project entitled "Rural Low-Income Families: Tracking Their Well-Being and Functioning in the Context of Welfare Reform," commonly called "Rural Families Speak." The first wave of data includes 413 rural mothers who earned below 200% of the Federal Poverty Guideline and had at least one child under the age of 13. Data was gathered over 3 waves from 23 rural counties in 13 states, between May, 1999 and October, 2003. The study was timed to examine the effects of welfare reform rules that limit benefit receipt to 60 months in a lifetime.

This study explores two significant issues related to poverty and depression symptomology. How to best measure poverty as it relates to depression symptomology is addressed in Phase 1, through a comparative analysis of six different poverty measures. Phase 2 utilizes two poverty measures that show the strongest relationship with depression symptomology to address the question of whether poverty causes depression, or depression causes poverty, through a comparison of social causation and social selection theories. Depression symptomology is determined through use of the Center for Epidemiologic Studies Depression Scale (CES-D).

Phase 1 analysis reveals food security as the poverty measure with the strongest relationship to depression symptomology. Annual income calculated as a percentage of the Federal Poverty Guideline shows the second strongest relationship. Phase 2 analyses are completed in four data runs. Two data runs that include a series of

regression analyses use food security and depression symptomology, interchanging each as the independent and dependent variables. The data runs are then repeated using the poverty guideline measure.

Phase 2 results reveal limited support for social causation theory, with a few models showing marginally significant effects when food security in an earlier wave predicts depression symptomology in a later wave. Implications for using food security as a measure of poverty, policy implications, directions for future research, and application of findings are discussed.

Keywords: depression, poverty measurement, social causation, social selection, food security

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Poverty Measurement and Depression Symptomology in the Context of Welfare Reform

In 1996, Congress enacted sweeping reforms to our nation's welfare programs. The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) changed Aid to Families with Dependent Children (AFDC) to Temporary Assistance for Needy Families (TANF), imposed a 5-year cumulative lifetime limit on benefits, imposed work requirements on receipt of benefits, and required states to make major changes in welfare programs (Boothroyd & Olufokunbi, 2001; Dooley & Prause, 2002; Taylor, 2001). Although significant numbers of former welfare recipients have moved into the workplace, many struggle to bring home a living wage or remain unemployed. Concern about barriers that prevent movement off welfare have brought attention to behavior (Dooley & Prause, 2002). The link between mental health as it dictates behavior and the persistent inability for some welfare recipients to move into living-wage employment has been receiving attention, as a possible explanation for why a sizable number of families remain on assistance 14 years after the enactment of welfare reform.

Researchers have employed various definitions and measures of poverty. Poverty has been described in literature as low socio-economic status (SES), low income, welfare receipt, social class, and poverty. Because these terms refer to a lack of financial resources, this dissertation uses the term poverty to describe the conditions of those who find it difficult, if not impossible, to earn enough income to consistently support themselves and their families. Methods used to measure poverty have been vastly different, and tap into various aspects of experience. Although experts debate the

most effective and accurate ways to measure poverty, no research was found that compares and contrasts existing measures of poverty as they relate to mental health or symptoms of depression.

The inverse association between mental illness and economic achievement is one of the most consistently replicated findings in the social sciences (Hudson, 2005). More specifically, the existence of a relationship between poverty and depression has been established through many years of research in a wide range of studies. Depression has also been measured in various ways, sometimes as a distinct variable, but more often as one component of mental health. Depression scales sometimes attempt to assess a likelihood of meeting criteria for Major Depressive Disorder (MDD), and shorter scales collect information on depressive symptomology. Shorter scales do not include enough questions to explore all the possible criteria in order to determine a depression diagnosis. This review will focus on depression by highlighting findings regarding depression symptomology or diagnoses when they exist, but will also report on findings that include depression as a component of mental health or psychiatric disorder.

Recent research has evolved toward understanding causal relationships between poverty and depression, by testing the competing theories of social causation and social selection. Researchers have sought to answer the question of whether depression causes poverty (social selection theory) or poverty causes depression (social causation theory). Some have tested these perspectives for individuals over time (Dooley & Prause, 2002; Hudson, 2005) and some have considered how parent variables affect outcomes in children (Johnson, Cohen, Dohrenwend, Link, & Brook, 1999; Miech, Caspi, Moffitt,

Wright, & Silva, 1999; Ritsher, Warner, Johnson, & Dohrenwend, 2001). This research has utilized large, representative datasets and has focused on urban populations. Relatively little research exists using solely rural populations when examining the relationship between poverty and mental health.

Rural residents face unique issues related to poverty. Across the United States, the poverty rate has been consistently higher in rural areas in the last half of the 20th century, when compared to urban counterparts (Duncan, 1992; Weber, Duncan, & Whitener, 2002). Throughout the 1990s, unemployment rates have been higher in rural areas, and the gap in unemployment rates between urban and rural areas was growing by the end of the decade (Weber, et al., 2002). While there is debate about how a presumed lower cost of living might affect the actual experience of poverty in rural areas (Weber, Jensen, Miller, Mosley, & Fisher, 2005), the poverty rate for rural families is 10% higher than for urban families, and the difference climbs to 20% when female-headed households are compared (Lichter & Jensen, 2001). This growing problem has been attributed to lagging economic performance in rural areas (Duncan, 1999), a decrease in extractive industries (mining, lumber), reforms in agricultural industry (Rural Sociological Society, 1993; Weber, et al., 2002), and a transformation from manufacturing to service employment (Weber, et al., 2002). Overall, poor rural mothers work more hours for less pay than their urban counterparts (Lichter & Jensen, 2001).

Rural welfare recipients face additional barriers to economic self-sufficiency when compared to those who live in cities. There is a lack of affordable, quality childcare, inconsistent transportation services, and a lack of support and health services

in rural areas (Weber, et al., 2002). The rural poor often lack the financial resources to meet basic needs, as evidenced by how private vehicle ownership is not the norm among the rural poor (Weber, et al., 2002). Social factors associated with family name or reputation consistently prevent one from attaining employment (Duncan, 1999), and the value among rural residents that hard work leads to financial success leads to an assumption that the poor are lazy and possess other character flaws (Weber, et al., 2002). The focus of this study is not upon rural issues, but it is important to be mindful of such barriers because they are likely to relate to depressive symptomology in a rural sample. It is simply more challenging to achieve self-sufficiency when one has to conquer these additional difficulties, in addition to universal barriers present in the labor markets and individual human capital deficits like lower educational attainment, psychiatric and health issues, or a lack of job skills.

The present study addresses current debates in the literature by examining and comparing methods used to define and measure poverty, and examining the relationship between poverty and depression symptomology. It utilizes a multi-state data set of rural low-income mothers. Data were collected in waves over a four-year period, during a time of welfare transition. The purpose of this research project is two-fold. First, this study will compare various ways in which poverty is measured and how each relates to depression as measured with the Center for Epidemiologic Studies Depression Scale (CES-D). Second, a longitudinal analysis using the two strongest poverty measures will be conducted to explore causal relationships with depression.

Literature Review

A century of research reveals an association between poverty and depression (Ritsher, et al., 2001). Research pertaining to depression and poverty has utilized various means and measures to define variables. This can be said to strengthen findings because diverse variable measurement methods build a stronger cumulative body of findings. On the downside, however, it is difficult to compare and contrast findings because the conceptualizations of these key variables are so diverse. This section will review the ways in which both depression and poverty have been defined and measured.

Measuring Depression

Depression is described as a mood disorder in which one experiences symptoms that include a loss of interest in pleasurable activities, lack of energy, and/or a depressed mood for a specified amount of time (American Psychiatric Association, 1994). The term "depression" is generally used to reference the diagnosis of Major Depressive Disorder (MDD) but is also applied to less severe diagnoses as determined by how long one has experienced symptoms or how debilitating symptoms are. One is diagnosed with MDD if they endorse the experience of at least five of nine possible criteria that persist over a 2-week period. Major Depressive Disorder is one of several mood disorders that include loss of interest or depressed mood, but is ruled out from other diagnoses based on the constellation of criteria experienced. For example, someone may experience symptoms of MDD, and also experience episodes of over activity, racing thoughts or delusions (manic episodes). In such cases, the correct diagnosis would be Bi-polar Disorder because the symptoms are not solely those for MDD. Depressive symptoms can also present as a reaction to some kind of situation or event,

and would typically resolve sooner than in the case of MDD. In such cases, the correct diagnosis would be a specified Adjustment Disorder.

Scales are commonly used tools that assess the presence of disorder symptomology. Though none of the research reviewed for the current study went into detail about the development of the scale measures used, it might be assumed the measures were built upon diagnostic criteria found within clinical manuals such as the Diagnostic and Statistical Manual of Mental Disorders (DSM) (American Psychiatric Association, 1994). The scale questions often mirror the criteria for diagnosis, by asking a question for each of the possible criteria listed in manuals like the DSM.

There are a number of challenges to creating a scale or survey that can accurately assign a diagnosis. For example, the literature reviewed for the current study includes or references three versions of the DSM (DSM-III, DSM-III-R, and DSM-IV). With advances in knowledge of mental health, diagnostic criteria have changed over time so that new versions of the DSM, with updated diagnostic criteria, have been published. It is important to consider when the scale in use was developed and if it had been updated to reflect current diagnostic criteria. Timeframe should be considered when comparing research so conclusions are meaningful and accurate.

Another challenge to the accurate diagnosis of MDD is that certain symptoms associated with MDD occur within the scope of several mood disorders. Mood disorders like Bi-polar Disorder and Dysthymia share symptoms and may be easily confused with MDD when information is gathered in a cross-sectional, retrospective way. Symptoms of MDD can occur after a traumatic event, in conjunction with substance abuse, as a consequence of a medical condition, or from medical treatment.

Women may experience depressive symptoms at certain times in their menstrual cycle (American Psychiatric Association, 1994). Depressive symptoms experienced in these contexts do not meet criteria for MDD. Knowing one's personal history and the context in which symptoms occur is essential, but it is difficult to assess personal history in a scale questionnaire or account for it in survey research.

A major feature of the diagnosis is the experience of symptoms (such as loss of appetite or energy, feelings of sadness, etc.) that occur almost every day for at least two weeks. Some questionnaires ask about experience in only the most recent week. One's cultural background can also influence the experience and description of symptoms (American Psychiatric Association, 1994). The concerns outlined here increase the likelihood of false positives and can skew our understanding about the prevalence of MDD in populations. Above all, it is important to remember that clinicians are trained to consider the context of a person's symptoms when diagnosing a clinical condition. Achieving an accurate understanding of someone's mental and emotional state solely from self-reported, scaled answers on five to twenty questions, without the benefit of observed or triangulated information, is difficult at best. Diagnosis is more of an art than pure science.

There are a variety of scales used by researchers that include some measure of MDD. The CES-D (Radloff, 1977) is a scale designed to assess the existence of depressive symptoms specifically, and has been used in several studies. Some authors indicated use of the 20-item scale version (Coiro, 2001; Dooley & Prause, 2002; Danziger, Carlson, & Henly, 2001), an abbreviated 12-item scale (Petterson & Friel, 2001), and others did not indicate which version was used (Bogard, Trillo, Schwartz, &

Gerstel, 2001; Horwitz & Kerker, 2001). Efforts have been made to develop shortened versions of the CES-D, using different combinations of questions from the 20-item scale (Cole, Rabin, Smith, & Kaufman, 2004; Martens, Parker, Smarr, Hewett, Ge, Slaughter, & Walker, 2006; Santor & Coyne, 1997). Most researchers noted that the CES-D is not a diagnostic measure, though it shows good agreement with diagnostic criteria, and some added it has been effective with diverse populations. It was suggested that the CES-D "is best thought of as a measure of demoralization – or depressive symptoms – directly resulting from unfortunate life events, or ongoing despair which is related to clinical depression" (Bogard, et al., p. 141), but not as a diagnostic measure.

There are several other surveys that have been used in research on depression and poverty. Some include a depression scale as one of several mental health scales, some researchers consider depression independently of other mental health issues, and others have lumped two or more scales together into an indicator of "mental health" or "psychological functioning." Other scales utilized include the Composite International Diagnostic Interview (CIDI) (Danziger, Kalil, & Anderson, 2000; Gresenz, Sturm, & Tang, 2001; Horwitz & Kerker, 2001; Jayakody & Stauffer, 2000), the Diagnostic Interview Schedule (DIS) and its adapted version, the Diagnostic Interview Schedule for Children (DISC) (Johnson, et al., 1999; Miech, et al., 1999), the General Well-Being Scale (Hildebrandt, 2002), Behavior Symptom Index (Taylor, 2001), the General Health Questionnaire (Brooks-Gunn, Klebanov, Smith, & Lee, 2001), the Symptom Checklist-22 (Montoya, Bell, Atkinson, Nagy, & Whitsett, 2002), the SF-36 Health Survey (Romero, Chavkin, Wise, Smith, & Wood, 2002), the Colorado Symptom Index

(Boothroyd & Olufokunbi, 2001), and the five-item Mental Health Index (Gresenz, et al., 2001).

There are many tools used to measure MDD, both as a specific variable and as one of several indicators of mental health. It appears that most are built upon established criteria for a diagnosis of MDD, though some scales do not include enough questions to address each specific criterion that must be considered as part of such diagnoses. Some list references for the tools used and others do not. It is difficult to know whether these tools have been updated as new criteria for mental health diagnoses have been established. The three most recent editions of the DSM appear to include minor changes to how MDD is diagnosed, so when the scale was developed may not be a significant issue for depression inventories. Recent updates related to MDD criteria involve clarification of the timing and severity level of psychotic or other specifiers, and how they should be interpreted (www.psych.org/MainMenu/Research/DSMIV). This type of change is very targeted, but may have a bearing upon the phrasing of survey questions. There is no discussion of how these measures have adapted to updates for MDD or any other group of related diagnoses, or whether they were accounted for, or there was a need to account for changes, at all. Such questions should be considered, to ensure that concepts are measured accurately. Some studies use only self-reported data, while others use additional data sources to confirm diagnoses. Two use clinical assessments to obtain a diagnosis of MDD. Overall, there is a wide range of ways in which these studies have defined "depression."

Measuring Poverty

Historical Perspective

Research on poverty in the United States began toward the end of the 1800s, in attempts to bring scientific understanding to a paradox identified by Henry George in 1879 that pointed out how the United State's great wealth and unprecedented productive capacity was accompanied by increasing number of people living in poverty (O'Connor, 2001). The earliest poverty researchers addressed common misconceptions by showing poverty was primarily the result of labor issues such as lack of work or discrimination, rather than personal or cultural issues like addiction or laziness. Most research has been conducted in urban areas, though there has been attention paid to the plight of the rural poor since the 1960s (Rural Sociological Society, 1993).

In her book, *Poverty knowledge*, Alice O'Connor (2001) makes the case that poverty research in the United States has been dominated by a tension between explaining poverty as a structural issue – related to opportunity for employment, discrimination against women and ethnic minorities, and wages – and as an individual or family issue – related to a lack of drive for achievement, individual characteristics leading to bad behavior and choices, and the transmission of a "culture of poverty" through families resulting in persistent poverty over generations. Recent research has named these opposing approaches to poverty research as "community studies" that explain poverty as a function of community demographics and economic structure variables, and "contextual studies" that explain poverty as a function of individual characteristics and community social/economic variables (Weber, et al., 2005). O'Connor (2001) illustrates that over time, government has become the dominant

generator of poverty research and politics has largely influenced what is studied and how it is framed. She forwards the notion that government has largely ignored the need to address structural issues and maintained the focus upon individuals, families, and at one point, communities, as the focus for change.

Poverty research also reveals an on-going connection with race. The 2008 poverty rate for families in the United States was 13.2% for all races. The percentages of those living in poverty are much higher among African Americans (24.6%) and Hispanics (23.2%). Smaller percentages of Asian American (11.6%) and Caucasian (8.6%) families live in poverty. Native Americans are not reported as a distinct group in these tables, though it is known that the percentage of Native Americans living in poverty is higher than the national average. In 1959, 54.9% of African American families lived in poverty.

An overall positive trend toward reducing racial disparities has been occurring ever since (U.S. Census Bureau, 2010). While the absolute gap in poverty rates between Caucasians and ethnic minorities has narrowed since 1960, large disparities persist and the lingering effects of past discrimination continue to limit the ability of people of color to take full advantage of current opportunities (Cancian & Danziger, 2009).

Research on poverty began in the late 1890s, and centered almost solely on uniquely American social influences, such as a legacy of slavery and institutional discrimination, that work against economic success for African Americans (O'Connor, 2001). The 1950s ushered in the society-wide adoption of strict social roles for men and women. Talcott Parsons declared the family's traditional economic and social functions had fallen away, and their new task was to socialize the next generation of

citizens and preserve social solidarity in an increasingly impersonal world (Doherty, Boss, LaRossa, Schumm, & Steinmetz, 1993). Debate arose about whether cultural problems were due to race or social class, with a growing emphasis on pathology among the black poor, and with a troubling trend in which some authors treated "lower-class pathology as an inherited psychological trait" (O'Connor, 2001, p. 199). The matriarchal black family was most strongly blamed for such problems and the contextual focus on individual characteristics in the study of poverty had taken root.

In his book entitled *The truly disadvantaged: The inner city, the underclass and public policy* (1987), William Julius Wilson declared inner city blacks as an underclass population ensnared in a "tangle of pathology" which was the result of structural changes that decimated inner city communities after 1970. The structural changes include movement of manufacturing jobs from cities to suburbs, which resulted in a massive loss of secure jobs for the low-skilled working class. Job loss eliminated the backbone of organization, discipline and meaning, especially for the black male, and left women with a diminishing pool of marriageable males from which to choose a mate. A second structural change was the loss of middle-class families to suburban communities, which resulted from victories against racism and opened up housing options for those who could afford to move. This migration to the suburbs left inner cities without role models and volunteers who contributed to and created thriving communities. The result was a concentrated poor population, entrenched in a cycle of teen pregnancy, welfare dependence, and crime (Wilson, 1987).

Critics of Wilson's view point out that he fails to recognize the strengths of poor blacks, or to consider these practices as an adaptive response that might offer an

alternative, non-pathological interpretation to the patriarchal view of families. Feminists said it was blaming the victim. Wilson's view defied community work that refuted the idea of cultural pathology and undercut efforts to rebuild communities from within. Paradoxically, Wilson's use of cultural pathology threatened to undermine his emphasis on the structural issues that perpetuated poverty in inner city communities (O'Connor, 2001).

Wilson's work did spawn renewed interest in understanding poverty and new initiatives were funded for research on the underclass and policy reform. There was an acknowledgement of the need to consider cultural factors related to the persistence of poverty, while not using cultural characteristics to blame the victim (Rural Sociological Society, 1993). The need for a far more proactive agenda was clear, and tools such as economic investment, labor market intervention and increased funding for safety nets were available to researchers to finally address the structural issues that had been historically ignored (O'Connor, 2001).

The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 did little to address the structural, or community, issues that have been highlighted again and again by research over the course of history (O'Connor, 2001). Despite an enlightened understanding of the interplay between culture and structural variables, the political climate ended welfare as an entitlement program and turned programs for cash assistance into a service industry aimed at job readiness and employment. Researchers and policy makers should not assume that poverty intervention policies based on research that has been primarily conducted in urban areas will be appropriate, effective, or even fair, for those who live in rural areas. We have much to learn about how rural

residence affects opportunities, how policy interventions can promote or hamper economic success, or what the effects of persistent poverty add up to be for rural communities and their residents (Weber, et al., 2005).

Poverty Measures

Poverty measurement is the subject of extensive debate. The U. S. government's official measure of poverty was created in the 1960s and has remained virtually unchanged over the past 45 years. The Johnson administration declared war on poverty in1964, which created a need to define poverty and gather widespread data to help in understanding the problem. The Food Stamp Act, passed in 1964, entitled low-income households to receive a share of the nation's abundance of food (USDA, 2008), but low-income was not clearly defined. Mollie Orshansky suggested in 1965 that a general guideline could be three times the cost of an economy food plan for various family types, but she never intended this proposal would become the income index for the next half decade (Citro & Michael, 1995; O'Connor, 2001). Though families spent roughly one-third of their income on food in the 1950s (Orshansky used data from 1955 to determine her measure), marked changes in economic and social realms have resulted in families spending, on average, about one-eighth of their incomes on food today (Blank & Greenberg, 2009). The current official measure does not consider the effect of anti-poverty programs such as cash, food and daycare assistance, tax credits, etc. In addition, data collection and analysis methods have improved drastically (Citro & Michael, 1995). Although there is consensus that the time has come for creating new measures, experts disagree on how to best define and measure poverty. Data collection is complicated by difficulty in gathering accurate financial data, mistrust among the

poor, and a host of other research barriers. This section will briefly review several methods of poverty measurement. See Roosa, Deng, Nair, and Burrell (2005) for a more thorough discussion of poverty research in the family field.

Poverty threshold of income. The poverty threshold is the income amount used by the Census Bureau to determine official poverty statistics. The poverty threshold is set as one nationwide standard, and is not adjusted to reflect local economic conditions. A major criticism is that this measure fails to account for differences and the depth of poverty within groups and across geographic regions (Roosa, et al., 2005). The poverty threshold measure draws a line at certain income levels based on family size, with consideration of the number of working adults and children in the household. The poverty threshold has been used in research to determine poverty level wages by comparing annual household income to tables for the year in which income was earned (Dooley & Prause, 2002).

Federal poverty guideline. The poverty guideline is issued by the U. S. Department of Health and Human Services for administrative purposes. The poverty guideline is a simplified version of the poverty threshold, and is typically used to determine eligibility for financial and other assistance programs. These figures are based on the poverty threshold, altered using the Consumer Price Index, to reflect price changes that occurred in the prior year (Department of Health and Human Services, 2007). Program eligibility is often determined by income limits that are set some percentage over the poverty line to qualify. Such eligibility guidelines acknowledge that families still need assistance even though they no longer count as poor within official poverty statistics in the U.S. For example the Supplemental Nutrition

Assistance Program (SNAP, formerly called Food Stamps) allows a family to earn up to 165% of the federal poverty guideline before becoming ineligible (Children's Defense Fund Bridge to Benefits, 2010). Minnesota TANF participants lose eligibility once they are earning 135% of the federal poverty guideline. The poverty guideline does not consider family composition as does the poverty threshold; it specifies income limits based only on the number of adults and children in the household and does not consider whether adults are of working age.

Several researchers have drawn study populations from programs that use poverty guidelines to determine eligibility, such as AFDC and TANF (Boothroyd & Olufokunbi, 2001; Danziger, et al., 2000; Danziger, et al., 2001; Hildebrandt, 2002; Jayakody & Stauffer, 2000; Romero, et al., 2002; Stromwall, 2001). Others have recruited from programs that serve welfare recipients who meet additional criteria such as having a child of a certain age (Coiro, 2001; Horowitz & Kerker, 2001; Taylor, 2001), a child with certain special needs (Brooks-Gunn, et al., 2001), or having certain habits related to drug use (Montoya, et al., 2002).

Food security. Some have promoted the idea that hunger is a marker of poverty, and the United States Department of Agriculture (USDA) has created a measure of food security to determine the level to which hunger exists in the United States. The framework for this endeavor recognizes "the experience of food insecurity and hunger as a sequence of stages reflecting increasingly severe deprivation of basic food needs and characterized by a managed process of decision making and behavior in response to increasingly constrained household resources" (Carlson, Andrews, & Bickel, 1999, p. 511). Food insecurity is higher in rural areas (Nord, et al., 2009). Measures of food

security have rarely been used in family and child poverty research (Roosa, et al., 2005).

Relative measure of poverty. Some have argued that a single standard of income is not reflective of the realities faced by families, and that income should be weighed against a standard of income in one's community. This view takes into account the impact of large scale economic growth in the U.S. since the 1980s, and how a standard of living is promoted by images delivered through mass media (Roosa, et al., 2005). Rather than focusing on the cost of essential purchases, this view encompasses perceptions of what poverty means to those living on limited incomes. This concept falls within a developing movement that measures social exclusion. Social exclusion assumes that a basic level of income is needed for one to fully participate in society. The concept of social exclusion has been applied through use of the "income inequality hypothesis" which states that communities with more equal income distributions are likely to have better health outcomes than more unequal communities (Gresenz, et al., 2001). In other words, people are more likely to experience depression when they live among others who earn substantially more, than if they live among others who earn slightly more than they earn themselves.

Relative measures of poverty are often defined as a percentage, typically between 40% and 60%, of the mean or median income for a specific country (Brady, 2003; Iceland, 2003), but incomes can be compared to smaller population groups to better reflect differences in local economies. Use of relative measures has been limited in research relating to mental health and depression. Gresenz and colleagues (2001) examined income differentials within 60 communities and found no support for the idea

that higher differences in income predicted increased rates of depression. One study used access to a car as proxy measure of material status (Targosz, Bebbington, Lewis, Brugha, Jenkins, Farrell, & Meltzer, 2003), reflecting that having a car marks a definite line between those who participate in society and those who do not.

Employment status. Some believe that the major source of poverty is structural, and that the prevalence of low-paying service sector jobs and policies such as those affecting minimum wages are to blame (Bauer, Braun, & Olson, 2000). Much of the research on employment and depression has been within the context of welfare reform, with populations who took part in programs designed to help them move into the workforce. Employment has been defined rather loosely in the research related to depression. Taylor (2001) described employment status as "'working," "in training or looking for work," and "not looking for work." Horwitz and Kerker (2001) labeled three groups as "currently working," "has ever worked since date of random assignment," or "not currently working." Coiro (2001) coded participants by whether they participated in education or job training, worked in any part of the recent two years, or left AFDC because they got a job or received a pay increase. TANF recipients in Michigan were defined as employed if they worked at least 20 hours per week (Danziger, et al., 2000) or as having a "steady job" if taxes were deducted from their paychecks (Danziger, et al., 2001). Bogard and colleagues (2001) asked homeless shelter residents to report the percentage of life history that covered spells of working full time and/or part time, in both formal and illegal economies.

The definitions of employment cited above are very loose, so that employment for any small number of hours worked per week may count as employment. This also

reflects realities faced by employment counselors who work in TANF programs, where any amount of work is recognized and celebrated as a success, even if a program participant remains dependent upon cash assistance. Although the research noted above did not seek to define poverty through employment status, other researchers have been more careful to account for rate of pay and number of hours worked. Dooley and Prause (2002) stated that those "who work part time involuntarily are typically counted as being employed, but are likely to experience greater economic hardship compared to those who work full time" (p. 794). Those who were "not adequately employed" due to low wages or involuntary part time work (under 35 hours per week) were included as a group, along with the "unemployed and looking," "out of the labor force," and "adequately employed." They defined low wages with a binary variable of either above or below the poverty threshold. As they lacked family data, they used income tables for a two-adult household, with no adjustment for the presence of dependent children, resulting in a low estimate of wages needed to sustain a family.

Petterson and Friel (2001) divided the subject pool into those who had received cash assistance in the previous twelve months and those who had not. Those who had not received assistance were further divided into those currently unemployed, and employed and making less than $6, between $6 and $10, and over $10 per hour. Ritscher and colleagues (2001) collected data on income and created a 9-point income scale that groups respondents into $10,000 income increments. Annual income and pay level gives the reader better information about where individuals stand financially, but family size is also an important demographic that has not been accounted for in these studies.

Socioeconomic status (SES). Measures of SES combine indicators of education, job prestige, and sometimes income, into a scale of social status. Use of SES was common in large database studies focusing on poverty and depression. The association between SES and mental illness was one of the most consistently replicated findings (Hudson, 2005; Johnson, et al., 1999). Measures of SES can be effectively used to stratify people in the general population, but such indicators lose effectiveness when studying poor populations because there is likely to be limited variation in SES status within a population of low wage earners (Roosa, et al., 2005). Also, SES scales have failed to keep pace with major changes in social and economic realms. Social status is more highly influenced by income as society has become more consumption oriented, and it is becoming increasingly difficult to assign a single occupation value to employment positions in today's market.

Despite these drawbacks, SES continues to be used as a variable. Many large datasets included questions that allowed the construction of SES as a variable. Three studies comparing social selection and social causation perspectives used SES to examine the relationship between mental health and poverty (Hudson, 2005; Johnson, et al., 1999; Miech, et al., 1999). Hudson (2005) measured SES on the basis of community level income, education and occupation, and generated a score for respondents based on SES status ratings in their ZIP code, or the ZIP code of their employer or medical insurance origin, if provided. Johnson and colleagues (1999) conducted a longitudinal investigation gathering data from parents, offspring and grandparents, and used education, occupation and income from both mothers and fathers to determine SES. Families were coded as above or below poverty level based

on their income. Offspring SES was computed based on whether they had completed high school or one or more years of college at the time of the last interview. Miech and colleagues (1999) used educational attainment as the indicator for SES, with young adult subjects who took part in the New Zealand Dunedin study.

Welfare status. Some research in this area examines welfare status and/or contact with the welfare system as it relates to mental health and depression. Dealing with the social services system is difficult, discouraging and demeaning, and recipients pay an emotional, social and physical price through the process of requesting and continuing to receive benefits (Frazer & Stum, unpublished manuscript). In addition to defining families as poor by virtue of their eligibility to receive cash assistance, this research taps into another area of daily life – the routine hassles faced by the poor. Some have compared mental health indicators among groups based on whether they were receiving welfare or not (Boothroyd & Olufokunbi, 2001; Jayakody & Stauffer, 2000; Petterson & Friel, 2001; Stromwall, 2001). Romero and colleagues (2002) included a measure of welfare system contact (no contact with welfare, application denied, application pending, former recipient, current recipient) to more closely examine the effects of welfare on maternal mental health. Nielsen, Juon, and Ensminger (2004) coded participants as experiencing long-term welfare contact if they had received assistance for 5 years or more.

National Academy of Sciences (NAS) recommendations. To address the debate over how to best measure poverty, and to create a more effective official measure of poverty, NAS commissioned a study, and put forth several recommendations for an

improved poverty measure (Citro & Michael, 1995). The major tenets of their recommendation include moves to consider:

1) Differences between workers and non-workers, to account for child care expenditures for families whose heads of households are employed.
2) Variations in medical care costs, as they differ based on health status and insurance coverage.
3) Price variations across geographic areas for needs such as housing.
4) Adjustments for family size that reflect current economies.
5) Changes in the standard of living, which call into question the use of annual adjustments, which have previously been based on inflation.
6) The effect of important government policy initiatives, such as Social Security, Food stamps, TANF, and any future tax policy changes that affect the money amounts available for family expenditures.

New measures using these recommendations rely upon actual expenditure data for necessities, including the value of in-kind benefits and the earned income tax credit, and excluding taxes and other expenses such as those related to work, child care and insurance (Dalaker, 2005). The new measures are touted as a more accurate and dynamic assessment of the cost of basic living for families. The obvious challenge is in gathering accurate data from which to build the measure, and from families through general research.

The Census Bureau released experimental poverty measures using the NAS recommendations in 1999 and 2001. New York has issued a measure based on NAS

recommendations for several years (M. Levitan, personal communication 9-27-10). It was announced in March of 2010 that the NAS recommendations will be utilized to create a second official poverty measure in the United States, called the Supplemental Poverty Measure. The new thresholds issued through the Supplemental Poverty measure are not intended to assess eligibility for government programs, nor replace the official poverty thresholds (Short, 2010). Many expect that the new measure will result in a higher poverty count. Those in favor say it will provide the tools to accurately assess who needs assistance and the effectiveness of anti-poverty programs. Conservatives charge that the federal government can ill afford to increase safety net spending, especially in the current economic recession (Vestal, 2010). The first report will be issued by the Census Bureau in the fall of 2011, alongside the current poverty measure (Federal Register, May 26, 2010).

The Gini coefficient. A final poverty indicator, the Gini coefficient, measures the degree of inequality in the distribution of family income within an entity, such as a country, region, or county. The measure is based upon the Lorenz curve, which plots the proportion of a population's total income (on the y axis) that is earned by a gradual proportion of the population (x axis). Thought of another way, cumulative family income is plotted on the y axis, against the number of families that are lined up from poorest to richest on the x axis. The Gini coefficient is the ratio of the area that lies between a line of equality (45 degree angle from (0,0) to (1,1)) and the Lorenz curve, divided by the total area under the line of equality. The more nearly equal the income distribution, the closer the Lorenz curve is to the 45 degree line, and the lower the Gini coefficient. The Gini coefficient can range from 0 to 1, with higher ratios indicating

higher inequality. It is also presented as the ratio multiplied by 100, or as a number between 1 and 100.

The Gini coefficient is an easily interpreted measure that can be used to compare income distributions across different populations at a point in time, or over time, as the ratio changes relative to changes in earnings within a population. The Gini coefficient can be applied for economies and populations of all sizes, and is calculated independent of whether an economy is considered rich or poor. It does not, however, consider inequality in opportunity, such as when a class structure imposes an unequal opportunity to earn income. Another caution is that the Gini coefficient can be used despite the method of income calculation, so it is important to consider what is counted. For example, reported income from some countries includes the value of anti-poverty program benefits and/or universal health care, while others do not. The Gini coefficient considers income, but typically not investments or other types of accumulated wealth. Gini coefficients for the United States have been going up in recent history – our Gini coefficient in 1997 was 40.8, in 2007 it was 45, and in 2010 it is reported as 50.3, reflecting a growing disparity in the distribution of wealth in the United States (Wikipedia, 2010; Central Intelligence Agency World Factbook, 2010).

Poverty has been defined and measured in a variety of ways in research related to depression. The poverty threshold of income, federal poverty guideline and the new Supplemental Poverty measure are nationally defined measures that are (or will be) widely used and referenced. These poverty measures are commonly used in research that establishes a link between poverty and depression. The NAS recommendations have not yet been utilized in official measures, but offer promise as they should more

accurately reflect poverty status by considering all income sources and expenditures. The food security measure was also created by an arm of the U.S. government, with the aim of determining hunger in the United States. It has rarely been used in family poverty research. Socio-economic status has been widely used, with differing definitions related to education and occupation. Measures like welfare status and employment status tend to be used in research with smaller populations. Relative income has been used in relation to depression because of how central one's perception of poverty is within the concept. The Gini coefficient is a common gauge of income distribution, but has not been utilized in research pertaining to depression. Overall, poverty measures differ on the specificity of criteria, the scope of what is included, and how different concepts are operationalized. The debate about how to measure poverty continues, and a need exists to compare and evaluate existing poverty measures as they relate to depression.

Findings on the Relationship Between Depression and Poverty

Recent research continues to confirm the relationship between poverty and depression. In comparisons between welfare recipients and non-recipients, welfare receipt has been largely found to co-occur with depression. Specifically, those with TANF experience have been found to experience higher rates of mental illness overall, in studies using both questionnaire measures (Boothroyd & Olufokunbi, 2001; Danziger, et al., 2001; Romero, et al., 2002) and clinician diagnosis of a variety of mental health issues (Stromwall, 2001). This association was also supported by research that measured depression specifically (Coiro, 2001).

Within the context of welfare reform, researchers have examined the effect of programming aimed at moving people into the workforce, and the effect employment has upon mental health. Unemployed welfare recipients were found to experience higher rates of mental health problems (Brooks-Gunn, et al., 2001; Danziger, et al., 2001; Romero, et al., 2002) and the likelihood of employment was found to be 25% lower for those with a psychiatric disorder (Jayakody & Stauffer, 2000). Women with higher levels of depression symptomology were less likely to stop receiving AFDC for even small periods of time, but were no less likely to attend school or find employment (Coiro, 2001). Those with mental health issues, coupled with a lack of human capital skills and physical limitations, were least likely to sustain employment (Danziger, et al., 2000).

Hidebrandt (2002) found that depression and anxiety are among the human costs of experience in work-based welfare program. In a comparison of new TANF programming and old AFDC assistance, depression was found to be prevalent among participants in both groups, and neither TANF programming nor depression symptom level appeared to have an effect upon transition to employment (Horwitz & Kerker, 2001). Rather, these researchers found social support, education level, and physical health predicted movement into the workforce.

Assessing the claim that welfare in itself has deleterious psychological consequences for single mothers, Petterson and Friel (2001) found that higher levels of depression and hopelessness among welfare recipients could be explained by mothers' experience of material hardship, rather than by the stigma attached to receiving welfare itself. Recipients of AFDC reported similar levels of depression and hopelessness as

jobless and low-wage non-recipients, and long-term welfare recipients did not experience greater emotional problems than short-term recipients. Feelings of hopelessness mediated the relationship between material deprivation and psychological distress for both recipients and non-recipients.

There has been discussion about what prevents movement away from welfare and into the workforce, and depression has been found to be a significant barrier to employment under new welfare regulations (Coiro, 2001; Jayakody & Stauffer, 2000; Stromwall, 2001). Taylor (2001) concluded that, among rural residents, depressive symptoms are related to one's *perception* of employment barriers and use of services, adding another dimension to the relationship between depression and poverty. Similarly, depression was found to predict how mothers deal with bureaucracy in a homeless shelter. Homeless shelter residents who reported less depressive symptoms at the onset of their stay were more likely to complete education or job training programs, while those with higher depressive symptoms were more likely to leave the shelter sooner and not complete programs (Bogard, et al., 2001). Jayakody and Stauffer suggest that mental health problems may prevent women from undertaking the tasks necessary to find employment, and they lack the self-confidence needed to take on new challenges. Others found personal mastery to be the key characteristic related to employment and risk of depression (Danziger, et al., 2001).

Studies that used income as a measure of poverty also reveal a link between depression and poverty. Montoya and colleagues (2002) claim wages were affected by psychological distress, such that even small improvements in psychological distress had a significant effect on increasing wages. Targosz and colleagues (2003) used the

availability of a car as a proxy measure for income, and found that poverty, social stress and depressive disorders clustered importantly for single mothers. They found economic and social disadvantage had a powerful association with mothers' experiencing a depressive episode. They suggest that "poverty is the context in which maternal depression feeds childhood mental disorders" (Targosz, et al., 2003, p. 721) as one link in a cycle that may lead to economic disadvantage for children as they age into adulthood. Taking a community level approach, Gresenz and colleagues (2001) found a relationship between income and mental health in an overall community sample and when comparing those in the lowest income group. The probability of a mental health disorder, including a depressive disorder, increased as income dropped. However, they found no evidence that higher levels of *income inequality* within a community were associated with poor mental health outcomes for community residents.

Social causation theory versus social selection theory

Research is evolving toward investigating causal relationships by conducting competing analyses between social causation and social selection models. In this realm, social causation theory states that those who are in poverty are more likely to experience depression, while social selection theory states that people who experience depression are more likely to be poor. Social causation theory says that being poor is a social contributor to poor mental health status; that by experiencing the conditions of limited income and resources, one is at greater risk to experience depression. The theory also suggests that long term poverty may cause biological changes in the brain that lead to depressive symptomology. Social selection theory says that depression negatively affects work and productivity, and that depression is an innate trait.

Four studies that test these competing theories used SES measures, and a variety of measures of depression were used. Studies that used SES measures tend to reveal results in support of social causation theory (Hudson, 2005; Johnson, et al., 1999; Ritsher, et al., 2001). Specifically, Hudson found strong evidence that the lower one's SES, the more likely they are to experience mental disability and psychiatric hospitalization. Johnson and colleagues' research results strongly support the claim that social causation processes play a more important role than social selection processes in the association between SES and anxiety, depressive and personality disorders, but such an association was not found between SES and substance abuse. Ritscher and colleagues found that low SES, defined as low parental education, was associated with increased risk of depression in their children. Miech and colleagues (1999) considered educational attainment as the core indicator of SES, and found no relationship between SES and depression in teens and young adults, but that other mental health disorders had various unique associations with SES.

Using welfare status as the measure of poverty, Dooley and Prause (2002) found support for an association between mental health, especially depression, which they concluded was due more to social causation by entry into welfare, than by social selection. They noted that depressive symptoms were especially prevalent among women on AFDC, and acknowledge that both social selection and social causation effects play a part. Simmons, Braun, Charnigo, Havens and Wright (2008) used a composite measure of economic status that combined a) family income as a percentage of the federal poverty guideline, b) number of hours worked per week, and c) perceived economic situation, and found social causation theory yielded a better approximation of

the relationship between economic status and depression than social selection theory. Using food insecurity as a measure of poverty, Huddleston-Casas, Charnigo and Simmons (2008) concluded that both theories operate in bidirectional fashion, indicating that a recursive relationship between poverty and household food insecurity exists. Taken as a whole, research on the competing theories of social causation and social selection is building in support of social causation theory, even as some studies conclude that both theories may operate in a recursive fashion.

Summary

This section reviews research on poverty and depression as an indicator of mental health. Within the current debate about how to best measure poverty, a number of methods have been presented. With few exceptions, this body of research continues to support an association between poverty and depression, and is tending toward identifying the experience of poverty as a cause of depression among the poor. Further research is needed to examine causal relationships between poverty and depression.

Methodology

The data for this research come from a USDA-funded, NC-233 multi-state, longitudinal project entitled “Rural Low-Income Families: Tracking Their Well-Being and Functioning in the Context of Welfare Reform” and commonly called "Rural Families Speak." The data set includes 3 waves of data from 23 rural counties in 13 states, collected between May, 1999 and October, 2003. This study was timed so data gathering would occur during the period when many welfare recipients reached their 5-year lifetime limit on receipt of benefits, a limit that was implemented during the welfare reform legislation signed into law in 1996. The purpose of the study was to examine the effects of welfare reform. All major regions of the United States are represented within the data set.

Study participants were gathered in a convenience sample recruited through programs that serve low-income individuals; including the Food Stamp Program, food pantries, housing authority programs, Supplemental Assistance for Women, Infants and Children (WIC), and welfare-to-work programs. The wave 1 sample includes 413 women. To be eligible for the study, a family had to earn below 200% of the federal poverty guideline and have at least one child under the age of 13. Participants ranged in age from 17 to 59, with most between the ages of 25 and 35. Forty-six of the wave 1 interviews were conducted in Spanish. Roughly one-third of participants had one child, 30% had two children, almost 20% had three children, and 12.6% had four children. The highest number of children in a family was 10. Table 1 presents additional information relevant to this study.

Table 1
Descriptive statistics by wave (in percentages)

Variable name	wave 1	wave 2	wave 3
	N=413	N=314	N=265
Race/Ethnicity			
Caucasian	64.6		
Latino	21.5		
African American	8.8		
Native American	.2		
Asian	.2		
Multi racial/other	4.6		
Marital status			
single	24.7	20.1	19.6
married	44.8	46.6	46.0
living w/partner	14.8	17.9	17.4
divorced	9.2	9.9	11.3
separated	6.6	5.4	5.7
Employed			
yes	50.8	60.1	57.8
no	49.2	39.9	42.2
Yearly household income			
$0	5.3	2.5	2.6
< $5000	10.0	4.5	3.1
$5001 - $10,000	20.1	13.7	8.6
$10,001 - $15,000	17.6	14.7	15.1
$15,001 - $20,000	15.5	10.8	15.1
$20,001 - $25,000	14.3	15.9	11.3
$25,001 - $30,000	8.0	10.5	10.2
$31,001 - $35,000	4.1	11.2	10.6
$35,001 - $40,000	3.2	4.4	6.8
$40,001 - $45,000	1.4	4.2	4.1
$45,001 - $50,000	.3	3.5	6.1
$50,001 +	.2	4.1	6.4
Mean income	$15,522	$22,774	$25,500
Median income	$13,996	$21,500	$22,396
Received TANF			
yes	20.2	13.8	15.2
no	79.8	86.2	84.8

Food security			
food secure	49.6	57.7	65.9
food insecure	50.4	42.3	34.1
Depression			
does not meet criteria	51.6	64.4	64.1
meets criteria (16+)	48.4	35.6	35.9

The purposes of the present study are 1) to compare various measures of poverty in their relation to depression symptomology, and 2) to test the strongest poverty measures in a comparison of social causation and social selection theories. Six different measures of poverty will be drawn or created from the data and the relationship each measure has with depression symptomology will be examined through a series of regression analyses. The question examined in the first phase of analysis is how the poverty measures compare with one another by examining whether there are significant differences in how each poverty variable relates to depression symptomology. Using a data set with the depression variable as a constant will provide an opportunity to make meaningful comparisons.

Assuming results will vary to some degree between poverty measures, the measures that reveal the strongest relationship with depression symptomology will be included in Phase 2 of data analysis. Phase 2 will consider two measures of poverty with depression symptomology in a longitudinal analysis testing the competing theories of social causation and social selection. It is hypothesized that there will be more evidence to support poverty as a cause of depression, or the social causation perspective, as has been the predominant finding in the literature.

Measuring Depression

The database used for the present study includes two measures of depressive symptomology. One measure is the 20-item Center for Epidemiological Studies Depression (CES-D) scale (Radloff, 1977), and the other is a single question included within a health questionnaire. The present study will use a cumulative point score of all 20 items on the CES-D. Like other self-report measures, the CES-D shares a weakness that a large proportion of high-scoring respondents would not actually meet criteria for a Depressive Disorder (Santor & Coyne, 1997). However, it remains widely used because it is a practical means to screen for depressive symptoms, is easily administered, and more economical than clinical assessment or interview diagnosis.

The CES-D boasts a number of benefits that make it desirable for use in research. It was developed for use with the general population and has been widely used in diverse research applications. Items on the CES-D were drawn from cognitive, behavioral, affective, and somatic clusters of symptoms that have been used to guide treatment decisions. It is easy to administer and score, and has shown satisfactorily high internal consistency (.85 to .92) among diverse demographic groups (Radloff, 1977). Studies have found good convergent validity, discriminative validity, sensitivity, and specificity (Cole, Rabin, Smith, & Kaufman, 2004).

One drawback of the CES-D is that it directs respondents to "check the box that best describes HOW OFTEN YOU HAVE FELT THIS WAY DURING THE PAST WEEK." As noted earlier, clinical diagnostic criteria for MDD includes endorsement of items for the previous 2 weeks or more. However, the CES-D is best thought of as a *screening tool* for depression that reveals valuable information about symptom severity.

The CES-D contains questions that are scored on a scale from 0 to 3, for a possible cumulative score of 60. A cumulative score of 16 is frequently referenced as a point that has been shown to indicate MDD (Dooley & Prause, 2002) or a clinically significant level of depressive symptoms (Radloff, 1977). Within the study data set, the CES-D has 386 complete inventories in wave 1, 295 in wave 2 and 245 in wave 3. Additional cases were added by imputing data for scales that had 4 or less missing items. The CES-D has high reliability within the current data set across waves 1 (α=.89), 2 (α=.91), and 3 (α=.92). Depression can be included as a continuous variable or binary variable depending upon the structure of poverty measures used in the second phase of analysis.

Measuring Poverty

Several poverty measures or variables exist or can be constructed from the data set. For the study, six measures of poverty were chosen, that could either be constructed from available data or existed in the database. Insufficient data prevents the construction of variables that fully reflect the NAS recommendations, or a meaningful representation of SES. The Gini coefficient, a macro indicator of poverty, is not a good match with the other variables in the analysis so it is not included. This section reviews variables that are used to measure poverty. See Table 2 for a summary of poverty variables reviewed, and Table 3 for frequency and size summaries for variables used in the present study.

Poverty guideline

A variable exists within the data set that has been calculated from reported annual household income (POVERTY#, where # indicates the wave of data collection). It is a continuous income variable that is the calculated percent of the Federal Poverty

Table 2
Measures of poverty

Variable lable	What measured	How measured	How structured
Poverty guideline (POVERTY#)	DHHS measure of annual household income, eligibility standard for all families	income as percent of poverty guideline	continuous income/pov guideline=%, exists in dataset
Relative income (RELINC#)	Income measure, relative to income of those in surrounding community	household income, as percent of median income for county of residence	continuous income/county median=%
Family well-being (WELLCAT#)	Percentage of poverty threshold - annual household income, considers family composition	1=in crisis (to 99%) 2=at risk (100–149) 3=safe(150–199) 4=thriving (200 +)	categorical # adult & kids determine cutoff, % calculated
Employment category (JOBCAT#)	Employment status and income level	1=adequately employed 2=inadequately employed 3=unemployed 4=out of labor force	categorical considers income, hours
TANF receipt (TANF#)	Received TANF support or not	0 = no 1 = yes	dichotomous reported TANF income
Food security (FSMY_N#)	Food secure or insecure	0=food insecure 1=food secure	dichotomous food secure/not
SES	Not used		
NAS recommendations	Not used		
Gini coefficient	Not used		

Table 3
Frequency and size of variables used in the present study

Measure	wave1	wave 2	wave3
Depression	386	295	245
Poverty guideline	413 (22=$0)	314 (8=$0, 1=ms)	265 (10=$0)
Relative income	413 (22=$0)	314 (9=$0)	265 (7=$0)
Family well-being	413 (22=$0)	314 (8=$0)	265 (7=$0)
Employment status reported	413	296	256
employed	210 (50.8%)	178 (60.1%)	148 (57.8%)
reported hours	162 (39.2%)	164 (55.4%)	194 (75.8%)
unemployed	108 (26.2%)	89 (30.1%)	68 (26.6%)
looking	76 (18.4%)	40 (13.5%)	35 (13.7%)
TANF receipt	413	312	258
yes	83 (20.1%)	43 (13.8%)	39 (15.1%)
no	330 (79.9%)	269 (86.2%)	219 (84.9%)
Food security	389	300	258
insecure	196 (50.4%)	127 (42.3%)	88 (34.1%)
secure	193 (49.6%)	173 (57.7%)	170 (65.9%)

Guideline for each year in which data was collected. As this variable uses reported annual income as its base, wave 1 includes 413 poverty guideline responses, wave 2 includes 314, and wave 3 includes 265.

Relative measure

A relative measure of poverty can be calculated using annual income and Census Data for median household income for each respondent's county of residence. Census Data lists median county income figures for households for 2000 and 2003 (U.S. Census, 2010). The largest change in county median annual income between 2000

and 2003 is about $2500. Most values grew by a few hundred dollars, but some declined slightly between 2000 and 2003. A new variable (RELINC#) lists household annual earnings as a percent of their county's median income. This variable is calculated using annual household income (YR_INCM#) divided by county median income for each year. Wave 1 data were gathered between May, 1999 and November, 2001, so Wave 1 income will be compared to Census Data income for 2000. Wave 2 data gathering occurred between August, 2000 and May, 2002. As Census Data includes no median county income figures for 2001 or 2002, each county's wave 2 median income is calculated by averaging the median income amounts listed for 2000 and 2003. Wave 2 relative income scores are then calculated using the averaged county median income amounts. Wave 3 was conducted between January, 2002 and December, 2003. Wave 3 amounts will be compared to Census data for 2003. Data for wave 1 includes 413 complete responses, wave 2 includes 314, and wave 3 includes 265. The relative income variable will be a continuous variable.

Family well-being

The data set contains no measure that incorporates the Federal Poverty Thresholds, but one can be calculated using annual income and demographic information collected in each wave. The Federal Poverty Threshold tables differentiate income cut-offs based on whether one or two adults live in the household, the age of adults, and how many children under the age of 18 live with in the household. For example, "married" or "living with partner" couples who have 0 children meet the threshold with an income of $11,531 or less in the year 2000. The 2000 table lists income thresholds of $13,861 for 2 adults and one child to $33,291 for two adults with

8 children. Income limits are also declared for solo adults with 0 children ($8959) to 8 children ($33,291).

To create this variable, study respondents are first screened on marital status (variable = M_STA_Y#). If the respondent is married or living with a partner, they are coded with a new variable (MARSTAT#=1) and considered to have 2 adults present in the household. Those who indicate being single, separated or divorced (MARSTAT#=0) are considered to have one adult in the household. All respondents and partners within the data set are under age 65. Both groups are screened to determine the number children in the household under the age of 18 (C1_AGEY1#, C2_AGEY#, etc), and families are then compared to the Federal Poverty Threshold tables based upon the number of working age adults and children living in the household (TTL_N_C#).

In the initial wave of data collection, each child in a family is assigned a number based upon their age, from oldest to youngest. If other children join the household, either by birth, blending families, or other means, they are assigned the next number in sequence. Therefore, children who joined or left households during the study are considered in these calculations by using the total number of children in the household (TTL_N_C#) and omitting any child who is 18 or older by December 31 of the data collection year. A new variable is created indicating the number of children in the household who are under 18 years of age (KIDS17Y#). The variables for total number and ages of children are manually compared as a check to ensure the correct number of children is listed when computing the threshold amount. Reported incomes for each

family (YR-INCM#) are compared with the Federal Poverty Threshold tables issued for the year 2000 in wave 1, 2001 in wave 2, and 2003 in wave 3.

The family's annual income is first calculated as a percentage of the Federal Poverty Threshold value for their family composition, and then the percentage is recoded into a descriptive coding system that places them in a scheme describing their financial well being. This categorical scheme provides a contrast to the continuous poverty guideline variable described above. The Welfare-to-Well-Being basic framework for individuals and families (Bauer, et al., 2000) emphasizes family economic well-being and correlates values to labels that describe how the family fares economically. Families are described as "in crisis," "at-risk," "safe," or "thriving," based upon their income as a percentage of the Federal Poverty Threshold. Those families considered "in crisis" earn up to 99% of the Poverty Threshold (WELLCAT#=4), "at-risk" families earn between 100% and 149% (WELLCAT#=3), "safe" families earn 150% to 199% (WELLCAT#=2) and "thriving" families earn 200% or more (WELLCAT#=1). The data set includes 413 complete cases listing marital status, number of children and annual income in wave 1. In wave 2, the number of cases with complete data for these variables drops to 314. In wave 3, the number is 265.

Employment category

The data set includes several questions pertaining to employment status. These items are coded into an employment status variable, reflecting the scheme proposed by Dooley and Prause (2002). Dooley and Prause used a 2-part approach to determining one's level of employment, with consideration of number of hours worked and income.

Adequate employment is determined by both working over 35 hours per week and earning 125% above poverty level income. Adding a category for inadequate employment is appropriate for use with a rural population given the prevalence of seasonal and part-time employment opportunities, and the lack of good paying jobs.

Respondents with complete data are coded into the categories “adequately employed,” “inadequately employed,” “unemployed and looking,” and “out of labor force.” Coding for the employment category variable is based primarily upon the respondent’s report of whether they were working or not, and if not working, whether they were looking for work. Those who reported being employed, are coded as adequately or inadequately employed based on number of hours worked and income, as a percentage of the Federal Poverty Guideline for the year of data collection. Adequate employment (JOBCAT# = 1) is coded for respondents when they indicate full-time hours (S_WRKHR# $\geq$ 35) and income that exceeds 125% of the poverty guideline (POVERTY# > 125). If either criterion is unmet for an employed individual, they are coded as "inadequately employed" (JOBCAT# =2).

Individuals who indicate they are not working and are looking for work (S_LOOK# = 1) are coded as “unemployed and looking” (JOBCAT# = 3). Those who indicate they are not working and are not looking for work are coded as “out of labor force” (JOBCAT# = 4). Respondents who endorse multiple employment status variables, such as working some hours per week and being a student, are coded as either adequately or inadequately employed, based upon their wage and hours worked per week. This variable is categorical.

Wave 1 data reveals just over half of 413 respondents were working, with 76 looking for work. Of 210 employed respondents, 162 report working between 1.5 and 55 hours per week. In wave 2, 178 of 296 total respondents report being employed, 89 report still being unemployed, and 40 report looking for work. One hundred sixty four respondents indicate working between 2 and 62 hours per week. In wave 3, 148 of 256 respondents indicate being employed, 108 indicate not working. Sixty-eight indicate still being unemployed since wave 2 with 35 looking for work. One hundred ninety-four respondents indicate working between 2 and 80 hours per week.

TANF status

Whether respondents receive TANF benefits (TANF#) and how much monthly support was received are included in the data set. It is preferable to treat income amounts as a continuous score, with the assumption that higher TANF grants correspond to greater need. However, relatively few respondents reported receiving TANF payments, so this variable is created as a binary indicator of whether TANF payments were received or not. In wave 1, 328 respondents indicate no TANF receipt, leaving 83 respondents who indicate receiving dollar amounts from $18 to $926. In wave 2, 43 respondents indicate receiving between $21 and $1029 in TANF aid. In wave 3, 39 respondents indicate dollar amounts between $50 and $900 in TANF aid.

Food security

Food security can be defined by a family's consistent and dependable access to food sufficient to maintain an active and healthy life (Nord et al., 2009). Families who face food insecurity experience issues related not only to food quantity, but food quality as well (Mammen, Bauer, & Richards, 2008). The study data set includes the USDA's

U.S. Household Food Security Survey, which is comprised of 18 questions about conditions known to characterize households that have difficulty meeting basic food needs (Nord, Andrews, & Carlson, 2009). The USDA first issued this survey in 1995, to determine the prevalence of food insecurity across United States. Each question in the survey asks about experience in the most recent 12 months and specifies a lack of money or other resources to obtain food as the reason for the behavior (Nord, et al., 2009). Two food security variables were created out of the USDA survey for the study data set. One variable is a 4-category measure that codes families as "food secure," "marginally food secure," "food insecure without hunger," and "food insecure." The other variable collapses the categories of "food secure" and "marginally food secure" into a "food secure" category, and the categories of "food insecure without hunger" and "food insecure" into a second category entitled "food insecure." This binary variable is used as the dependent variable in this study. Food security has been determined for 389 families in wave 1, 300 in wave 2 and 258 in wave 3.

Socioeconomic status

As mentioned earlier, challenges exist when trying to describe socioeconomic status (SES) as an indicator of poverty status. Because this is a study of rural residents, opportunity for higher status job attainment is limited. Traditional measures of SES like education could be misleading in a rural context because of challenges that exist in finding a good employment match. Most limiting for this study, the data set includes a job index for the respondent in only wave 3. The SES classification system used at the federal level changed during the course of data collection. Other researchers have

found use of the job index to be unproductive (J. Bauer, personal communication, 6-18-07). Therefore, this measure will not be utilized in the present study.

National Academy of Sciences (NAS) recommendations

The recommendations of the National Academy of Sciences on how to create a more accurate measure of poverty are an important contribution and include several considerations that are missing in the current official poverty measure. Unfortunately, this data set does not include dollar amounts for many income sources and expenditures that are recommended by Citro and Michael (1995). The data set includes dollar amounts for income through TANF, Food Stamps, child support, etc., but not for other sources such as child care assistance, housing and energy assistance, school lunch reductions, Earned Income Tax Credits, Social Security and disability payments, and the like. Questions asking about tax liabilities or refunds, and total household output for childcare and transportation are also not included. It is possible to create an indicator that includes some in-kind income, but the total picture would be incomplete without a full accounting of all sources of income and all expenditures related to each family's situation. Such an indicator would serve to boost income amounts without the balance that including expenditures would provide. Therefore, this analysis will not include a measure that reflects the NAS recommendations.

Gini coefficient

The Gini coefficient is a measure of income distribution within a geographic area and exists as a ratio of inequality of income distribution for the area's population. This type of variable is inconsistent with how poverty measures are being used in the present study. The poverty variables in this study describe individual families and will

be used in regression analyses to determine the strength of relationships between a family's poverty measure and the mother's depression symptomology. Therefore, Gini coefficients will not be created or used for this study.

Missing Data

Depression variable

Some depression scales within the data set are partially completed so the score total is incomplete. Incomplete scales were inspected individually, and no discernable patterns regarding unanswered questions appeared. Most cases with 4 or less missing answers are missing only one answer, and were considered for data imputation. Cases with more than 4 items skipped were counted as missing from the data set. When a case is missing 4 or fewer answers, a rounded average of the other answers was imputed, replacing the missing value. After values were imputed, total scores were inspected. In all cases but two, the overall depression score is either very low or very high, and the imputed value didn't change whether the scale score is above or below 16. This is significant because a score of 16 is considered a score that indicates a likelihood of being diagnosed with Major Depressive Disorder. There are 2 CES-D scales administered in wave 2 in which the imputed value brings the total score to 16. Scores were imputed in 14 cases in wave 1, 14 in wave 2, and 13 in wave 3.

Scores were not imputed for poverty measures. The values for poverty guideline, relative income and family well-being are computed using reported annual household income. If the annual income amount is missing, it was not imputed and counts as missing. Variable values for TANF receipt and food security are also either given or not. Variable values for employment category were inspected to ensure the

assigned values fit the overall picture for each case, but individual values were not changed or assigned.

Overall, the literature confirms that a strong relationship exists between depression and poverty. Both depression and poverty have been defined and measured in a variety of ways. This project addresses the need for a comparative analysis between poverty measures and their relationship with depression symptomology. The large dataset available for this project allows for consistency among a host of factors that could not have been controlled across the scope of research in this area. This allows for a meaningful comparison of poverty measures as they relate to depression symptomology. After determining which poverty measures have the strongest relationship to depression symptomology, an analysis testing the competing theories of social causation and social selection occurs. This project should add a meaningful piece to the debate on how to best measure poverty, and add knowledge to the literature on causal links between depression and poverty.

Statistical Analyses

Phase 1

The goal of Phase 1 is to compare six different poverty measures as they relate to depression symptomology. These tests include wave 1 data only, with depression symptomology as the continuous dependent variable. To begin, descriptive statistics on variables of interest (see Table 4) are run to determine the scope of the data and ensure that relationships exist. Three demographic control variables - participant age, marital status, and age of youngest child - are included in the comparative regression analyses.

Table 4
Summary of variable parameters

Variable	Value	Mean	Median	Range
Depression symptomology				
wave 1	20 items,	17.56	15	0-53
wave 2	Likert scale,	14.54	12	0-56
wave 3	values 1-4	14.45	12	0-54
Poverty guideline				
wave 1	annual	85.61	78.40	0-293.73
wave 2	income as	91.13	81.59	0-529.11
wave 3	% of poverty guideline	123.92	109.43	0-629.16
Relative income				
wave 1	annual income as	37.34	37.78	0-255.00
wave 2	% of county	53.78	53.37	0-378.45
wave 3	median	58.49	55.95	0-411.54
Family well-being				
wave 1	1=thriving	3.39	4	1-4
wave 2	2=safe	2.89	3	1-4
wave 3	3=at risk 4=in crisis	2.78	3	1-4
Employment category				
wave 1	1=adequate	2.72	2	1-4
wave 2	2=inadequate	2.54	2	1-4
wave 3	3=unemployed 4=out of labor force	2.66	3	1-4
TANF receipt				
wave 1	0=no	.201	0	0-1
wave 2	1=yes	.138	0	0-1
wave 3		.151	0	0-1
Food security				
wave 1	1=secure	.496	2	1-2
wave 2	2=insecure	.577	1	1-2
wave 3		.659	1	1-2

Participant age				
wave 1	in years	30.1	29	17-59
wave 2		30.5	29	17-58
wave 3		31.8	30	19-60
Marital status				
wave 1	1=single	--	2.0 (44.8%)	1-5
wave 2	2=married	--	2.0 (46.6%)	
wave 3	3=living w/partner	--	2.0 (46.0%)	
	4=divorced			
	5=separated			
Age of youngest child				
wave 1	in years	3.2	2.0	0-13

Participant age has been shown to impact CES-D levels (Bogard, et al., 2001) and marital status and age of youngest child contribute to one's daily stress level, which is likely to have an impact upon depressive symptomology.

The first step in determining the relational strength between variables is to run correlations and chi-square analyses. The correlation analysis includes the continuous and categorical variables. When variables are not continuous, correlations provide a limited test of their relationship. Therefore, chi-square tests will be run with the categorical and dichotomous variables, using depression symptomology re-coded into 2 categories, based on whether or not one's score meets or exceeds a cut-off score of 16.

Phase 2

Regression analyses are run with the two poverty measures revealed to have the strongest relationship to depression symptomology in Phase 1. In essence, these tests examine the influence of the independent variable, as it exists at an earlier point in time, upon the dependent variable, as it exists at a later point in time. The passage of time

between measurement periods allows for the inference of causation. When data from the same measurement period are used as both independent and dependent variables, one can claim predictive effects, but not causal effects. When an independent variable that exists in a previous time period is found to have a significant effect upon a dependent variable at a later point in time, it can be interpreted that the independent variable caused a difference in the dependent variable. The equations used for the data runs are detailed below.

Testing social causation theory

Tests are run to explore whether poverty causes depression symptomology. A series of data runs add control variables to explore the relationship between poverty and depression, and to test the overall support of the theory.

Model A. For the data runs that include depression symptomology as the dependent variable, the CES-D score for depression in wave 2 is put into the model with the poverty score for wave 1 as the independent variable. This will test whether one's poverty status in wave 1 has a causal effect upon the experience of depression symptomology in wave 2. The formula run in model A is:

$$Dep2 = ß_0 + ß_1\ Pov1$$

Model B. This model adds depression status in wave 1 to control for its influence when predicting the depression symptomology in wave 2. The formula for the second models is:

$$Dep2 = ß_0 + ß_1\ Pov1 + ß_2\ Dep1$$

Model C. This model adds demographic control variables to Model B.

$$Dep2 = ß_0 + ß_1\ Pov1 + ß_2\ Dep1 + ß_3\ age + ß_4\ marital\ status$$

$+ ß_5$ child age

Model D. This model includes the wave 2 poverty variable to control for the known association between poverty and depression in the same wave.

$Dep2 = ß_0 + ß_1$ Pov1 $+ ß_2$ Pov2

Model E. This model adds demographic control variables to Model D.

$Dep2 = ß_0 + ß_1$ Pov1 $+ ß_2$ Pov2 $+ ß_3$ age $+ ß_4$ marital status

$+ ß_5$ child age

Model F. This model includes both wave 1 depression symptomology and wave 2 poverty variables as controls. Wave 1 depression is likely to predict wave 2 depression, and poverty has a known association with depression in the same wave.

$Dep2 = ß_0 + ß_1$ Pov1 $+ ß_2$ Pov2 $+ ß_3$ Dep1

Model G. This model adds the demographic control variables to Model F.

$Dep2 = ß_0 + ß_1$ Pov1 $+ ß_2$ Pov2 $+ ß_3$ Dep1 $+ ß_4$ age $+ ß_5$ marital status

$+ ß_6$ child age

The data set contains 3 waves of data, so additional analyses are included to test whether depression or poverty scores over 2 time periods have a causal relationship with the 3rd time period. Depression symptomology from wave 3 is the dependent variable. Poverty in waves 1 and 2 are included as predictors and depression symptomology in waves 1 and 2 are included as controls. The formulas testing social causation over 3 waves, with and without demographic controls, are:

Model H. $Dep3 = ß_0 + ß_1$ Pov1 $+ ß_2$ Pov2 $+ ß_3$ Dep1 $+ ß_4$ Dep2

Model I. $Dep3 = ß_0 + ß_1$ Pov1 $+ ß_2$ Pov2 $+ ß_3$ Dep1 $+ ß_4$ Dep2 $+ ß_5$ age

$+ ß_6$ marital status $+ ß_7$ child age

The final pair of models control for poverty in wave 3, and add demographic controls:

Model J. $Dep3 = ß_0 + ß_1\ Pov1 + ß_2\ Pov2 + ß_3\ Pov3 + ß_4\ Dep1 + ß_5\ Dep2$

Model K. $Dep3 = ß_0 + ß_1\ Pov1 + ß_2\ Pov2 + ß_3\ Pov3 + ß_4\ Dep1 + ß_5\ Dep2 + ß_6\ age + ß_7\ marital\ status + ß_8\ child\ age$

Testing social selection theory

To test the competing theory of social selection, or whether depression causes poverty, the same series of tests are run with the poverty measure as the dependent variable and depression symptomology as the independent variable. The equations models used for testing social selection are:

Model A. $Pov2 = Ó_0 + Ó_1\ Dep1$

Model B. $Pov2 = Ó_0 + Ó_1\ Dep1 + Ó_2\ Pov1$

Model C. $Pov2 = Ó_0 + Ó_1\ Dep1 + Ó_2\ Pov1 + Ó_3\ age + Ó_4\ marital\ status + Ó_5\ child\ age$

Model D. $Pov2 = Ó_0 + Ó_1\ Dep1 + Ó_2\ Dep2$

Model E. $Pov2 = Ó_0 + Ó_1\ Dep1 + Ó_2\ Dep2 + Ó_3\ age + Ó_4\ marital\ status + Ó_5\ child\ age$

Model F. $Pov2 = Ó_0 + Ó_1\ Dep1 + Ó_2\ Dep2 + Ó_3\ Pov1$

Model G. $Pov2 = Ó_0 + Ó_1\ Dep1 + Ó_2\ Dep2 + Ó_3\ Pov1 + Ó_4\ age + Ó_5\ marital\ status + Ó_6\ child\ age$

Model H. $Pov3 = Ó_0 + Ó_1\ Dep1 + Ó_2\ Dep2 + Ó_3\ Pov1 + Ó_4\ Pov2$

Model I. $Pov3 = Ó_0 + Ó_1\ Dep1 + Ó_2\ Dep2 + Ó_3\ Pov1 + Ó_4\ Pov2 + Ó_5\ age + Ó_6\ marital\ status + Ó_7\ child\ age$

Model J. $Pov3 = Ó_0 + Ó_1\ Dep1 + Ó_2\ Dep2 + Ó_3\ Dep3 + Ó_4\ Pov1 + Ó_5\ Pov2$

Model K. $Pov3 = Ó_0 + Ó_1\ Dep1 + Ó_2\ Dep2 + Ó_3\ Dep3 + Ó_4\ Pov1 + Ó_5\ Pov2 + Ó_6\ age + Ó_7\ marital\ status + Ó_8\ child\ age$

Data analysis sequence

The analysis will be conducted in four data runs that include depression symptomology and the two poverty measures shown to have the strongest relationship with depression symptomology. Each data run will include all models, and consist of regression analyses that fit the variable structure. The four data runs will be:

Data run #1 tests social causation theory. The poverty measure shown to have the strongest relationship to depression symptomology in Phase 1 is the independent variable, and depression symptomology is the dependent variable.

Data run #2 tests social selection theory. Depression symptomology is the independent variable and the poverty measure used in data run #1 is the dependent variable.

Data run #3 tests social causation theory. The identical series of tests is run with the poverty measure shown to have the second strongest relationship to depression symptomology in Phase 1. This poverty measure is the independent variable and depression symptomology is the dependent variable.

Data run #4 tests social selection theory. Depression symptomology is the independent variable and the poverty measure used in Data run #3 is the dependent variable. It is likely that the two poverty measures revealed to have the strongest relationship with depression symptomology have different structures. The regression tests utilized are determined by the dependent variable structure.

Results

Phase 1

Results from correlation and chi-square analyses reveal that almost every poverty measure included has a significant relationship to depression symptomology. However, the food security and poverty guideline measures are revealed to have the strongest relationship. All poverty measures except family well-being are significantly correlated with depression symptomology. Food security is related to depression symptomology at the $p < .001$ level of significance. The correlation coefficient between depression and the poverty guideline is -.139 and shows a relationship at the $p < .01$ significance level. Both employment status and relative income have similar correlation coefficients (.119 and -.115 respectively) and are significantly related to depression symptomology at the $p < .05$ significance level.

These analyses also reveal that all poverty measures included are correlated with one another, some to a very high degree. This is expected, as three of the measures (poverty guideline, relative income, and family well-being) utilize reported annual income as their base. This high correlation between poverty measures does not present a problem as only one poverty measure is included at a time in the data runs that comprise Phase 2. While no demographic control variable shows a significant relationship to depression symptomology, age shows a positive and significant correlation with the poverty measures that utilize annual income as their base. Additionally, marital status is significantly correlated with food security and age, though coefficients between them are low. None of the poverty measures exceed a

Table 5
Correlation matrix for wave 1 variables

Variable name	1	2	3	4	5	6	7	8	sd
1. Depression	1.0								11.34
sig (2 tailed)									
N	399								
2. Poverty guideline	-.139	1.0							54.24
sig (2 tailed)	.005								
N	399	413							
3. Relative income	-.115	.602	1.0						39.85
sig (2 tailed)	.022	.000							
N	399	413	413						
4. Family well-being	.078	-.846	-.562	1.0					0.85
sig (2 tailed)	.122	.000	.000						
N	398	412	412	412					
5. Employment	.119	-.311	-.912	.264	1.0				1.04
sig (2 tailed)	.018	.000	.000	.000					
N	399	413	413	412	413				
6. Age	.021	.208	.212	-.145	-.087	1.0			7.47
sig (2 tailed)	.674	.000	.000	.003	.080				
N	396	409	409	408	409	409			
7. Marital status	.052	.015	.053	-.013	.016	.179	1.0		1.13
sig (2 tailed)	.301	.761	.282	.798	.743	.000			
N	399	413	413	412	413	409	413		
8. Age youngest	-.007	.039	.042	.007	-.029	-.007	.033	1.0	2.82
sig (2 tailed)	.883	.433	.396	.884	.558	.889	.511		
N	393	406	406	405	406	402	406	406	

multicollinearity between independent correlation coefficient of .30 with the demographic control variables, so the risk of variables is minimized (Knoke & Bohrnstedt, 1994). The correlation matrix is shown in Table 5.

Table 6
Chi-square analysis between depression and poverty variables in wave 1

Variable	Chi-square	df	p
Family well-being	4.53	4	.339
Employment category	6.59	4	.159
Received TANF	4.05	2	.132
Food Security	19.53	2	.000***

** p < .05 significance level*
***p < .01 significance level*
****p < .001 significance level*

Chi-square tests are run with the categorical and dichotomous variables to test relational strength. Food security is the only variable used in this analysis that shows a significant relationship to depression symptomology. The effect size for food security, as indicated by the chi-square statistic, is 3 to 4 times larger than for any other variables, and the relationship is highly significant at the p = .000. Results of the chi-square tests can be found in Table 6. While employment shows a significant relationship to depression symptomology in the correlation analysis, it does not show one in the chi-square analysis. Family well-being is not indicated as having a significant relationship to depression symptomology in either the correlation or chi-square analyses.

It is interesting to note that the three measures based on reported annual income have differing effectiveness as predictors of depression. The poverty guideline, relative income, and family well-being measures are all created based on annual household income, but show different effectiveness. The poverty guideline measure is reported annual income calculated as a percentage of the Federal Poverty Guideline levels. The

relative income measure is annual household income computed as a percentage of the median income for the respondent's county of residence. The family well-being measure also uses reported annual income and computes income as a percentage of the Federal Poverty Threshold, which takes into account family composition. For the family well-being measure, respondents are grouped into one of four categories, depending upon the calculated percentage of the poverty threshold. Even though all three variables are built from reported annual income, the poverty guideline and relative income measures have different relationships with depression symptomology than the family well-being measure.

To test whether the lack of relationship between depression symptomology and the categorical family well-being measure was an effect of collapsing the data, depression symptomology and the poverty threshold variable were run in a correlational analysis, and were shown to have a significant relationship ($p = .005$) of -.143. The poverty threshold variable shows nearly the same correlation coefficient as the poverty guideline variable (-.139, $p = .005$). Their similarity is not surprising, as both variables are built from reported annual income, and the conversion tables for each are similar. As both measures are similarly related to depression symptomology, the analyses in Phase 2 will be conducted with the poverty guideline measure. This exercise illustrates that how data are manipulated and presented is important and can make a significant difference.

Overall results for Phase 1 of this study indicate the food security measure clearly comes out as the strongest predictor of depression symptoms among the various poverty measures. The negative relationship indicates those who are food secure are

less likely to experience depressive symptoms, which is the expected relationship. The poverty guideline measure is also shown to be a strong predictor of depression symptomology. As expected, those who have higher percentages of income relative to the poverty guidelines are less likely to experience depression symptomology.

Phase 2

Binary logistic regression analyses will be used in data runs when food security is included as the poverty variable. To test the competing theory in a companion run, depression symptomology will be converted to a dichotomous variable, based upon a whether the cumulative score is at or above 16. When food security is included as an independent variable, it will be categorical. Depression symptomology will be a continuous variable when in equations as an independent variable. For data runs using the continuous poverty guideline and depression symptomology variables, Ordinary Least Squares (OLS) regression analysis will be employed. Poverty guideline and depression symptomology will remain as continuous variables when they are entered as either dependent or independent variables in the equations. This will make comparisons between the tests more simple and should eliminate effects that may occur because the tests require different statistical procedures. Tables for data run #1 and #2, which use Binary Logistic regression, will include the Nagelkerke R^2 value, to assist in comparing results from the OLS regression analyses. Pseudo R^2 values attempt to improve upon prediction of the null model (University of California-Los Angeles Academic Technology Services, 2011). The Nagelkerke R^2 values tend to be lower than OLS R^2 values, as they range from 0 to 1. The higher the R^2 value, the more the model is an

improvement on prediction of the null model (North Carolina State University College of Humanities and Social Sciences, 2011).

The analyses that comprise Phase 2 are broken into data runs, based upon the variables used and the theory being tested. The data runs include a thorough series of tests that explore the advantages and disadvantages of using different combinations of variables. Models add demographic control variables, and can be compared with companion models that do not include demographic controls. The point of Phase 2 is to explore how poverty and depression symptomology relate to each other, not to find a single equation that most positively predicts the relationship. Exploring causal relationships between depression and poverty is an emerging area of exploration and results thus far favor social causation theory. An exploratory analysis of these relationships will add to the literature in this emerging area of research. Interpretation of data and presentation of tables is based upon guidance found in Leech, Barrett & Morgan, 2008).

Data run #1

This model tests the theory of social causation, specifically addressing the question of whether poverty causes depression, using food security as the poverty measure. The models build upon the premise that lower food security in an earlier wave causes higher depression scores in a later wave. Eight of the twelve equations in this data run significantly predict depression at the $p < .001$ level of significance, when all predictor variables are considered together. However, when examining variable effects within each equation, food security in wave 2 consistently predicts depression symptomology in wave 2. This provides support for an association between poverty and

depression, but does not support poverty as a cause of depression. Food security in wave 1 is not found to account for a significant level of variance in any of the equations that include depression symptomology in wave 2.

Once the data runs include depression symptomology in wave 3 as the dependent variable, the equations gain predictive power, and food security in wave 2 now significantly contributes to each equation. Food security in wave 2 shows *B* values between - .42 and - .45 with standard errors all near .20. However, the odds ratios for food security in wave 2 are all the lowest values within each equation. Food security in wave 3 and depression symptomology in earlier waves continue to show *B* values at roughly 3 times the standard error rate for each, and the odds ratios for these control variables indicate much higher odds of change in depression symptomology due to changes in control variable values. Adding demographic controls increases the $\chi 2$ values slightly, but also decreases the N included the equation. Given that none of the demographic controls showed a sizable relationship with depression, it is expected that they would not have a notable effect.

One point of confusion is the switching of directional influences of the food security variable depending upon what variables are in the equation. Food security in wave 1 has a positive coefficient in some models, and negative in others. A positive coefficient for food security says that the more food insecure someone is, the more likely they will experience depression symptomology. For the most part, the effects are the same between an equation (model) and the same equation with demographic controls added. The one exception is between Model D and Model E, where the directional influence changes once the demographic control variables are added. The odds ratios for

Table 7
Data run #1 -- Binomial logistic regression analyses testing social causation theory using food security

Equation/variables	*B*	*SE*	*Odds ratio*	*p*
Model A: Dep2 = $ß_0$ + $ß_1$ Pov1				
Food security 1	- .81	.12	.92	.923
Constant	- .36	.29	.70	.216
χ2=.494, Nagelkerke R^2=.002, df=1, N=272, p=.482				
Model B: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Dep1				
Food security 1	- .19	.13	.82	.130
Depression 1	.03	.01	1.03	.029*
Constant	- .60	.32	.55	.062
χ2=5.598, Nagelkerke R^2=.029, df=2, N=258, p=.061				
Model C: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Dep1+ $ß_3$ age + $ß_4$ marital status + $ß_5$ child age				
Food security 1	- .22	.13	.80	.094
Depression 1	.02	.01	1.02	.058
Age	- .02	.02	.98	.285
Marital status	.09	.13	1.10	.468
Child age	.04	.05	1.04	.372
Constant	- .25	.75	.78	.743
χ2=8.064, Nagelkerke R^2=.043, df=5, N=254, p=.153				
Model D: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2				
Food security 1	- .11	.12	.90	.363
Food security 2	.569	.13	1.77	.000***
Constant	- 1.51	.41	.22	.000***
χ2=21.815, Nagelkerke R^2=.109, df=2, N=261, p=.000***				
Model E: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2 + $ß_3$ age + $ß_4$ marital status + $ß_5$ child age				
Food security 1	1.16	.13	.85	.216
Food security 2	.55	.13	1.74	.000***
Age	- .02	.02	.98	.180
Child age	.07	.05	1.07	.175
Constant	-1.05	.80	.35	.185
χ2=24.796, Nagelkerke R^2=.127, df=5, N=254, p=.000***				
Model F: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2+ $ß_3$ Dep1				
Food security 1	- .21	.13	.81	.122
Food security 2	.55	.13	1.73	.000***
Depression 1	.03	.01	1.03	.048*
Constant	- 1.71	.45	.18	.000***
χ2=23.269, Nagelkerke R^2=.122, df=3, N=248, p=.000***				

Model G: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2+ $ß_3$ Dep1+ $ß_4$age + $ß_5$ marital status + $ß_6$ child age

Food security 1	- .23	.14	.79	.091
Food security 2	.53	.14	1.70	.000***
Depression 1	.02	.01	1.02	.103
Age	- .02	.02	.98	.383
Marital status	.06	.14	1.06	.678
Child age	.06	.05	1.06	.227
Constant	-1.37	.85	.26	.109

$\chi 2$=24.832, Nagelkerke R^2=.132, df=6, N=244, p=.000***

Model H: Dep3 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2+ $ß_3$ Dep1 + $ß_4$ Dep2

Food security 1	.25	.17	1.23	.154
Food security 2	-.42	.19	.65	.027*
Depression 1	.06	.02	1.07	.000***
Depression 2	.03	.02	1.03	.120
Constant	-1.81	.61	.16	.003**

$\chi 2$=25.595, Nagelkerke R^2=.201, df=4, N=162, p=.000***

Model I: Dep3 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2+ $ß_3$ Dep1 + $ß_4$ Dep2 + $ß_5$ age + $ß_6$ marital status + $ß_7$ child age

Food security 1	.24	.18	1.27	.177
Food security 2	-.45	.20	.64	.024*
Depression 1	.06	.02	1.07	.001***
Depression 2	.02	.02	1.02	.161
Age	.00	.03	1.00	.865
Marital status	.29	.18	1.33	.113
Child age	.09	.07	1.10	.160
Constant	-2.83	1.14	.06	.013*

$\chi 2$=29.204, Nagelkerke R^2=.229, df=7, N=160, p=.000***

Model J: Dep3 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2 + $ß_3$ Pov3 + $ß_4$ Dep1 + $ß_5$ Dep2

Food security 1	- .04	.20	.96	.843
Food security 2	- .42	.20	.66	.037*
Food security 3	.61	.21	1.84	.004**
Depression 1	.06	.02	1.03	.001***
Depression 2	.03	.02	1.03	.155
Constant	- 2.38	.67	.09	.000***

$\chi 2$=33.826, Nagelkerke R^2=.264, df=5, N=159, p=.000***

Model K: Dep3 = + $ß_1$ Pov1 + $ß_2$ Pov2 + $ß_3$ Pov3 + $ß_4$ Dep1 + $ß_5$ Dep2+ $ß_6$ age + $ß_7$ marital status + $ß_8$ child age

Food security 1	- .10	.22	.90	.637
Food security 2	- .42	.21	.66	.044*
Food security 3	.74	.23	2.10	.001***
Depression 1	.06	.02	1.07	.001***
Depression 2	.02	.02	1.02	.236
Age	.01	.03	1.00	.732
Marital status	.42	.19	1.52	.030*
Youngest child	.09	.07	1.09	.209
Constant	- 4.03	1.27	.02	.002**

$\chi 2$=39.984, Nagelkerke R^2=.310, df=8, N=157, p=.000***

**p < .05, **p < .01, ***p < .001.*

food security, in either direction, are relatively large. This is likely the result of colinearity between food security variables in different waves. Variables from different waves are added as controls, and these variables are so highly correlated, so the directional influences leave the reader wondering about their exact effect upon the dependent variable. Therefore, what Data run #1 offers in support of social causation theory is mixed, and weak, at best. The results of Data run #1 are found in Table 7.

Data run #2

This data run tests the theory of social selection, or whether depression causes poverty. This is the companion run to Data run #1, as it uses the same variables but places food security as the dependent variable. This data run reveals 9 equations that predict food security to a significant degree when all variables in the equation are considered – one at the $p < .05$ level of significance, eight at the $p < .001$ level of significance. This data run reveals that equation variance is primarily accounted for by the depression symptomology control variable in the same wave or by the control

variable food security in wave 1, even in models that include food security wave 3 as the dependent variable. The odds ratios for food security wave 1 are higher than in Data run #1. This is because food security wave 1 takes a greater share of the variance when predicting food security in later waves, in comparison to Data run #1 which places depression symptomology was the dependent variable.

The directional effects of food security are more consistent within this model. Food security wave 1 consistently, though not significantly, exerts a negative influence predicting that as one becomes less food secure, CES-D scores increase. However, once food security wave 3 is entered as the dependent variable, food security wave 1 becomes a significant predictor and its direction changes to a unexpected positive direction. Food security wave 2 then exerts a negative influence, though not large or significant. Once the direction of food security wave 1 becomes positive, it accounts for the largest amount of variance among variables, and at the $p < .001$ level of significance. Again, the flipping of directional influence is likely the result of high correlations between the same poverty measure in different waves.

Depression symptomology wave 1 exerts no significant effects that would indicate a causal relationship with food security. Depression symptomology only accounts for a significant amount of variance when it exists as a control variable, from the same wave of data collection, relative to the dependent variable. There is no support for depression symptomology as causing poverty in Data run #2. Much like Data run #1, the run includes several significant models, but closer examination of the models reveals that control variables account for model variance and depression symptomology from an

Table 8
Data run #2 -- Binomial logistic regression analyses testing social causation theory using food security

Equation/variables	*B*	*SE*	*Odds ratio*	*p*
Model A: Pov2 = $Ó_0$ + $Ó_1$ Dep1				
Depression1	.02	.01	1.02	.118
Constant	- .61	.22	.54	.006**
χ2=2.453, Nagelkerke R^2=.012, df=1, N=279, p=.117				
Model B: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Pov1				
Depression 1	.02	.01	1.02	.077
Food security 1	- .16	.12	.85	.185
Constant	- .39	.32	.68	.216
χ2=3.896, Nagelkerke R^2=.020, df=2, N=262, p=.143				
Model C: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Pov1 + $Ó_3$ age + $Ó_4$ marital status + $Ó_5$ child age				
Depression1	.02	.01	1.02	.156
Food security1	- .19	.13	.83	.128
Age	- .03	.02	.97	.105
Marital status	.25	.13	1.28	.047*
Child age	- .05	.05	.96	.351
Constant	.16	.74	1.17	.830
χ2=11.324, Nagelkerke R^2=.058, df=5, N=257, p=.045*				
Model D: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2				
Depression 1	.01	.01	1.00	.418
Depression 2	.05	.01	1.05	.000***
Constant	-1.15	.28	.32	.000***
χ2=17.434, Nagelkerke R^2=.086, df=2, N=265, p=.000***				
Model E: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2+ $Ó_3$ age + $Ó_4$ marital status + $Ó_5$ child age				
Depression 1	.01	.01	1.00	.618
Depression 2	.05	.01	1.05	.000***
Age	- .02	.02	.98	.204
Marital status	.30	.13	1.35	.018*
Child age	- .05	.05	.96	.345
Constant	- .96	.71	.38	.178
χ2=26.025, Nagelkerke R^2=.128, df=2, N=260, p=.000***				

Model F: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Pov1

Depression 1	.01	.01	1.01	.455
Depression 2	.04	.01	1.04	.001***
Food security 1	- .05	.13	.95	.698
Constant	- 1.09	.38	.34	.004*

χ2=14.591, Nagelkerke R^2=.077, df=3, N=248, p=.002**

Model G: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Pov1 + $Ó_4$ age + $Ó_5$ marital status + $Ó_6$ child age

Depression 1	.01	.01	1.01	.637
Depression 2	.04	.01	1.05	.001***
Food security 1	- .06	.13	.94	.645
Age	- .02	.02	.98	.193
Marital status	.35	.13	1.28	.063
Child age	- .05	.05	.95	.295
Constant	- .68	.80	.51	.394

χ2=21.084, Nagelkerke R^2=.122, df=6, N=244, p=.002**

Model H: Pov3 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Pov1 + $Ó_4$ Pov2

Depression 1	.02	.02	1.02	.264
Depression 2	.02	.02	1.02	.266
Food security 1	1.03	.19	2.79	.000***
Food security 2	-.23	.19	.79	.220
Constant	-3.22	.68	.04	.000***

χ2=41.994, Nagelkerke R^2=.303, df=4, N=169, p=.000***

Model I: Pov3 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Pov1 + $Ó_4$ Pov2+ $Ó_5$ age + $Ó_6$ marital status + $Ó_7$ child age

Depression 1	.02	.02	1.02	.304
Depression 2	.03	.02	1.03	.171
Food security 1	1.11	.21	3.02	.000***
Food security 2	- .29	.20	.75	.155
Age	- .03	.03	.97	.235
Marital status	- .41	.21	.67	.049*
Child age	- .02	.08	.98	.757
Constant	- 1.42	1.30	.24	.274

χ2=51.682, Nagelkerke R^2=.370, df=7, N=166, p=.000***

Model J: Pov3 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Dep3 + $Ó_4$ Pov1 + $Ó_5$ Pov2

Depression 1	.01	.02	1.01	.592
Depression 2	.02	.02	1.02	.394
Depression 3	.04	.02	1.04	.034*
Food security 1	1.03	.21	2.81	.000***
Food security 2	- .11	.20	.90	.590
Constant	-3.87	.77	.02	.000***

$\chi 2$=46.215, Nagelkerke R^2=.347, df=5, N=159, p=.000***

Model K: Pov3 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Dep3 + $Ó_4$ Pov1 + $Ó_5$ Pov2 + $Ó_6$ age + $Ó_7$ marital status + $Ó_8$ child age

Depression 1	.01	.02	1.01	.698
Depression 2	.02	.02	1.02	.344
Depression 3	.05	.02	1.05	.011*
Food security 1	1.13	.23	3.09	.000***
Food security 2	- .14	.22	.87	.529
Age	- .02	.03	.98	.488
Marital status	- .52	.22	.60	.017*
Child age	- .02	.08	.98	.790
Constant	- 2.38	1.40	.09	.088

$\chi 2$=56.544, Nagelkerke R^2=.416, df=8, N=157, p=.000***

**p < .05, **p < .01, ***p < .001.*

earlier wave does not significantly predict poverty in any of the models. Results of Data run #2 are found in Table 8.

Data run #3

This run repeats the test of social causation using the continuous poverty guideline variable as the independent variable. Both poverty guideline and depression exist as continuous variables, which allow the use of Ordinary Least Squares regression procedures. Data run #3 includes 5 equations that significantly predict depression symptomology when all variables in the equation are considered. Model F, which includes poverty guideline wave 2 and depression symptomology wave 1 as controls, is marginally significant, with most of the variance accounted for by depression

symptomology wave 1. Depression symptomology wave 1, which is entered as a control, continues to be the strongest predictor in all the significant equations predicting depression symptomology wave 3. These equations all have adjusted R^2 values around .14, which is interpreted as 14% of the variance in depression symptomology can be predicted from the variables included in the equation (Leech, Barrett & Morgan, 2008). While significant in predictive power, the predictive ability of these equations is not a very large. Again, while several models significantly predict depression symptomology, none reveal the poverty measure from a previous wave as accounting for much of the variance. Values for poverty guideline hover around .00 within the significant models. The directional effects switch randomly in this data run, but the effects in either direction are minimal. Results for Data run #3 can be found in Table 9.

The R^2 values for all equations in data run #3 are low. In equations that include data from waves 1 and 2 only, no R^2 value exceeds .04. Those that include all 3 waves of data do not reveal R^2 values over .18. *B* values for independent variables in equations are all at or below .40, are all close in value. This says that the equations have very limited power and don't account for much of the variance in predicting depression. The demographic control variable marital status seems to have the greatest predictive power of all variables, most likely revealing that those who have 2 adults living in the home are likely to have higher incomes, and a higher percentage relative to the federal poverty guidelines.

Table 9
Data run #3 -- OLS Regression analyses testing social causation with poverty guideline variable

Equation/variables	*B*	*SE*	*Odds ratio*	*p*
Model A: Dep2 = $ß_0$ + $ß_1$ Pov1				
Poverty guideline 1	.02	.01	.10	.097
Constant	12.62	1.26		.000***
Note. R^2 = .01; F (1, 293) = 2.77; p < .097.				
Model B: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Dep1				
Poverty guideline 1	.02	.01	.11	.079
Depression 1	.11	.06	.11	.066
Constant	10.68	1.71		.000***
Note. R^2 = .02; F (2, 272) = 2.97; p < .053.				
Model C: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Dep1 + $ß_3$ age + $ß_4$ marital status + $ß_5$ child age				
Poverty guideline 1	.02	.01	.10	.088
Depression 1	.10	.06	.10	.114
Age	- .03	.09	- .02	.738
Marital status	1.03	.64	.10	.107
Child age	.17	.25	.04	.499
Constant	8.98	3.78		.018*
Note. R^2 = .03; F (5, 264) = 1.71; p < .134.				
Model D: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2				
Poverty guideline 1	.02	.01	.10	.095
Poverty guideline 2	- .01	.01	- .10	.077
Constant	14.28	1.57		.000***
Note. R^2 = .02; F (2, 292) = 2.97; p < .053.				
Model E: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2 + $ß_3$ age + $ß_4$ marital status + $ß_5$ child age				
Poverty guideline 1	.02	.01	.10	.096
Poverty guideline 2	-.01	.01	- .11	.073
Age	-.10	.08	- .07	.219
Marital status	1.06	.62	.10	.087
Child age	.14	.24	.03	.564
Constant	14.73	3.38		.000***
Note. R^2 = .03; F (5, 280) = 1.95; p < .087.				

Model F: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2 + $ß_3$ Dep1

Poverty guideline 1	.02	.01	.11	.073
Poverty guideline 2	-.02	.01	-.11	.063
Depression 1	.12	.06	.12	.042*
Constant	12.30	1.91		.000***

Note. R^2 = .03; F (3, 271) = 3.16; p < .025*.

Model G: Dep2 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2 + $ß_3$ Dep1+ $ß_4$ age + $ß_5$ marital status + $ß_6$ child age

Poverty guideline 1	.02	.01	.11	.081
Poverty guideline 2	-.12	.01	- .11	.077
Depression 1	.11	.06	.11	.079
Age	- .03	.09	-.02	.719
Marital status	1.07	.63	.10	.092
Child age	.14	.24	.03	.578
Constant	10.60	3.88		.007**

Note. R^2 = .04; F (6, 263) = 1.96; p < .072.

Model H: Dep3 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2 + $ß_3$ Dep1 + $ß_4$ Dep2

Poverty guideline 1	- .01	.02	- .05	.487
Poverty guideline 2	- .00	.01	- .01	.912
Depression 1	.40	.07	.38	.000***
Depression 2	.09	.07	.09	.193
Constant	7.37	2.49		.004**

Note. R^2 = .16; F (4, 178) = 8.36; p < .000***.

Model I: Dep3 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2 + $ß_3$ Dep1 + $ß_4$ Dep2 + $ß_5$ age + $ß_6$ marital status + $ß_7$ child age

Poverty guideline 1	- .01	.02	- .04	.550
Poverty guideline 2	.00	.01	- .00	.962
Depression 1	.38	.08	.37	.000***
Depression 2	.08	.07	.08	.249
Age	- .07	.11	- .05	.518
Marital status	1.04	.79	.09	.188
Child age	.38	.30	.09	.204
Constant	6.27	4.79		.192

Note. R^2 = .17; F (7, 172) = 5.11; p < .000***

Model J: Dep3 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2 + $ß_3$ Pov3 + $ß_4$ Dep1 + $ß_5$ Dep2

Poverty guideline 1	- .01	.02	- .04	.579
Poverty guideline 2	.00	.01	.00	.956
Poverty guideline 3	- .01	.01	- .09	.204
Depression 1	.40	.08	.38	.000***
Depression 2	.10	.07	.09	.177
Constant	8.44	2.62		.002**

Note. R^2 = .17; F (5, 177) = 7.04; p < .000***.

Model K: Dep3 = $ß_0$ + $ß_1$ Pov1 + $ß_2$ Pov2 + $ß_3$ Pov3 + $ß_4$ Dep1 + $ß_5$ Dep2+ $ß_6$ age + $ß_7$ marital status + $ß_8$ child age

Poverty guideline 1	- .01	.02	- .03	.640
Poverty guideline 2	.00	.01	.01	.920
Poverty guideline 3	- .01	.01	- .08	.246
Depression 1	.38	.08	.37	.000***
Depression 2	.09	.07	.08	.233
Age	- .06	.11	- .04	.632
Marital status	1.08	.79	.10	.172
Child age	.39	.20	.08	.233
Constant	6.61	4.79		.170

Note. R^2 = .18; F (8, 171) = 4.65; p < .000***.

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*p < .05, **p < .01, ***p < .001.

Data run #4

This run tests social selection theory, using poverty guideline as the dependent variable, in Ordinary Least Squares regression analyses. The results from Data run #4 break trends seen in the previous models. There are fewer significant models, and those that are significant (Model B and Model D) are simpler and contain no demographic control variables. The R^2 values in all models are all close to 0, with the highest R^2 value at .07. A high levels of significance is not achieved, as both significant models are just within the p < .05 level of significance. In Model B, the control variable poverty guideline wave 1 accounts for more variance than depression symptomology wave 1. Both Model B and Model D have R^2 values of .02 which is significant at p<.05. Model D contains depression symptomology from waves 1 and 2 and the *B* values are equal but in

opposite directions. The *B* value for the constant is 86.87 in Model B and 120.51 in Model D, which are both much higher compared to all equations in data run #3. High values for the constant indicate that a large portion of the variance is not accounted for by variables in the equation. This data run is the only one in which the directional effects for depression symptomology change, while all directional effects for poverty guideline are positive. The results from Data run #4 are found in Table 10.

The demographic control variables add little to any equation. None of the variables are consistently significant in equations testing either theory. Marital status randomly appears as a significant predictor in data runs that include the food security variable. Marital status is a categorical variable that is not structured in a progressive manner, so scores do not go progressively from good to bad, or positive to negative. The values assigned are merely descriptors of the respondent's marital state. Because the number assignments are somewhat random, the effects of this variable may go in either direction, but do not appear to be meaningful.

Taken as a whole, there is not strong support that causal relationships exist. However, there is small amount of evidence to support the theory of social causation – that poverty causes depression – and no support for social selection theory. Data runs that test social causation include more significant equations, and stronger variable effects within equations. Data run #1 includes three equations in which food security from a previous wave significantly predicts ($p < .05$) depression symptomology in a later wave. Data run #4 includes 1 equation, with depression symptomology wave 1 and depression symptomology wave 2 as a control, which significantly predicts poverty guideline wave 2

Table 10
Data run #4 -- OLS Regression analyses testing social causation with poverty guideline variable

Equation/variables	*B*	*SE*	*Odds ratio*	*p*
Model A: Pov2 = $Ó_0$ + $Ó_1$ Dep1				
Depression 1	.36	.41	.05	.380
Constant	86.87	8.45		.000***
Note. R^2 = .00; F (1, 384) = 0.77; p < .380.				
Model B: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Pov1				
Depression 1	.49	.41	.06	.233
Poverty guideline 1	.21	.09	.13	.015*
Constant	66.74	11.75		.000***
Note. R^2 = .02; F (2, 383) = 3.39; p < .035*.				
Model C: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Pov1 + $Ó_3$ age + $Ó_4$ marital status + $Ó_5$ child age				
Depression 1	.77	.45	.11	.087
Poverty guideline 1	- .00	.09	- .00	.979
Age	.23	.66	.02	.723
Marital status	1.46	4.66	.02	.754
Child age	-.45	1.77	-.02	.799
Constant	101.67	27.44		.000***
Note. R^2 = .01; F (5, 280) = .64; p < .669.				
Model D: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2				
Depression 1	.84	.44	.12	.057
Depression 2	-.83	.45	- .11	.068
Constant	120.51	10.65		.000***
Note. R^2 = .02; F (2, 272) = 3.19; p < .043*.				
Model E: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ age + $Ó_4$ marital status + $Ó_5$ child age				
Depression 1	.81	.46	.11	.076
Depression 2	-.79	.46	-.11	.084
Age	-.17	.67	-.02	.801
Marital status	3.51	4.77	.05	.462
Child age	-1.90	1.83	-.06	.300
Constant	123.52	27.07		.000***
Note. R^2 = .03; F (5, 264) = 1.53; p < .181.				

Model F: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Pov1

Depression 1	.86	.44	.12	.053
Depression 2	- .85	.46	- .11	.063
Poverty guideline 1	.04	.09	.03	.674
Constant	116.87	13.72		.000***

Note. R^2 = .02; F (3, 271) = 2.18; p < .090.

Model G: Pov2 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Pov1 + $Ó_4$ age + $Ó_5$ marital status + $Ó_6$ child age

Depression 1	.84	.46	.12	.069
Depression 2	-.82	.46	-.11	.077
Poverty guideline 1	.05	.09	.03	.598
Age	-1.17	.67	-.02	.799
Marital status	3.63	4.78	.05	.448
Child age	-1.92	1.83	-.06	.295
Constant	118.73	28.58		.000***

Note. R^2 = .03; F (6, 263) = 1.32; p < .250.

Model H: Pov3 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Pov1 + $Ó_4$ Pov2

Depression 1	- .30	.60	-.04	.615
Depression 2	.10	.59	.01	.872
Poverty guideline 1	.24	.12	.14	.048*
Poverty guideline 2	.14	.08	.13	.074
Constant	93.56	19.94		.000***

Note. R^2 = .04; F (4, 190) = 1.96; p < .102.

Model I: Pov3 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Pov1 + $Ó_4$ Pov2+ $Ó_5$ age + $Ó_6$ marital status + $Ó_7$ child age

Depression 1	.03	.62	.00	.958
Depression 2	.08	.60	.01	.891
Poverty guideline 1	.25	.12	.15	.039*
Poverty guideline 2	.14	.08	.13	.085
Age	1.62	.92	.13	.079
Marital status	4.33	6.48	.05	.505
Child age	-1.69	2.42	-.05	.485
Constant	30.97	39.08		.429

Note. R^2 = .06; F (7, 183) = 1.78; p < .093.

Model J: Pov3 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Dep3 + $Ó_4$ Pov1 + $Ó_5$ Pov2

Depression 1	.09	.66	.01	.896
Depression 2	.37	.60	.05	.544
Depression 3	-.81	.63	-.10	.204
Poverty guideline 1	.18	.13	.10	.170
Poverty guideline 2	.14	.08	.13	.085
Constant	101.08	21.49		.000***

Note. R^2 = .04; F (5, 177) = 1.48; p < .199.

Model K: Pov3 = $Ó_0$ + $Ó_1$ Dep1 + $Ó_2$ Dep2 + $Ó_3$ Dep3 + $Ó_4$ Pov1 + $Ó_5$ Pov2+ $Ó_6$ age + $Ó_7$ marital status + $Ó_8$ child age

Depression 1	.39	.68	.05	.569
Depression 2	.34	.60	.04	.575
Depression 3	-.74	.64	-.09	.246
Poverty guideline 1	.18	.13	.11	.164
Poverty guideline 2	.14	.08	.13	.096
Age	1.71	.95	.14	.074
Marital status	4.50	6.65	.05	.500
Child age	-1.85	2.52	-.06	.463
Constant	36.98	40.37		.361

Note. R^2 = .07; F (8,171) = 1.54; p < .147.

(p < .05). Both depression variables account for almost the identical amount of variance in the equation.

Because the directional effects were inconsistent and sometimes unexpected, additional tests are added to see if control variables behave the same or differently between waves 2 and 3. Data from waves 2 and 3 are tested in similar fashion as tests using data from waves 1 and 2. These "check runs" reveal results similar to the sign switching that occurs in Data runs #1 through #4. The directional effects of both poverty and depression symptomology are consistent in one direction until a control variable from a different wave is added to the equation. The direction then changes. This verifies that the directional effects are a product of high colinearity between like measures from different waves. These runs also mirror trends seen in the data runs. R^2 values are low,

Table 11
Data Run # 1 check using wave 2 and 3 data

Equation/variables	*B*	*SEB*	p
Model A check: Dep3 = $Ó_0$ + $Ó_1$ Pov2			
Food security 2	- .24	.15	.106
Constant	- .10	.33	.762
Note. $\chi 2$ = 2.67; Nagelkerke R^2=.002, df=1, N=190; p < .102.			
Model B check: Dep3 = $Ó_0$ + $Ó_1$ Pov2+ $Ó_2$ Dep2			
Food security 2	- .31	.16	.051
Depression 2	.01	.01	.306
Constant	-.17	.36	.632
Note. $\chi 2$ = 4.15; Nagelkerke R^2=.038, df=2, N=182; p < .126.			
Model C check: Dep3 = $Ó_0$ + $Ó_1$ Pov2+ $Ó_2$ Dep2 + $Ó_3$ age + $Ó_4$ marital status + $Ó_5$ child age			
Food security 2	- .30	.16	.063
Depression 2	.01	.01	.362
Age	- .03	.02	.220
Marital status	.03	.15	.854
Child age	.09	.06	.108
Constant	.27	.87	.755
Note. $\chi 2$ = 4.35; Nagelkerke R^2=.055, df=3, N=179; p < .226.			
Model E check: Dep3 = $Ó_0$ + $Ó_1$ Pov2+ $Ó_2$ Pov3 + $Ó_3$ Dep2			
Food security 2	- .37	.18	.035*
Food security 3	.72	.16	.000***
Depression 2	.02	.02	.206
Constant	- 1 .67	.51	.001***
Note. $\chi 2$ = 26.48; Nagelkerke R^2=.122, df=3, N=179; p < .000***.			

*p < .05, **p < .01, ***p < .001.

and those that edge up are for variables within the same wave as the dependent variable. The models that include food security show similar trends in *B* values and have $\chi 2$ values that are higher than the R2 values in data runs #3 and #4. The "check runs" can be found in Tables 11, 12, 13, and 14.

Table 12
Data Run # 2 check using wave 2 and 3 data

Equation/variables	*B*	*SEB*	p
Model A: Pov3 = $ß_0$ + $ß_1$ Dep2			
Depression 2	.01	.01	.897
Constant	- .60	.24	.014*
Note. $\chi 2$ = .02; Nagelkerke R^2=.012, df=1, N=197; p < .897.			
Model B: Pov3 = $ß_0$ + $ß_1$ Dep2 + $ß_2$ Pov2			
Depression 2	.01	.01	.686
Food security 2	- .29	.33	.381
Constant	- .26	.46	.570
Note. $\chi 2$ = .80; Nagelkerke R^2=.020, df=2, N=189; p < .670.			
Model C: Pov3 = $ß_0$ + $ß_1$ Dep2 + $ß_2$ Pov2+ $ß_3$ age + $ß_4$ marital status + $ß_5$ child age			
Depression 2	.01	.02	.518
Food security 2	- .48	.35	.175
Age	- .07	.02	.004**
Marital status	.16	.15	.278
Child age	- .03	.06	.650
Constant	1.63	.98	.096
Note. $\chi 2$ = 12.14; Nagelkerke R^2=.059, df=5, N=185; p < .033*.			
Model E: Pov3 = $ß_0$ + $ß_1$ Dep2 + $ß_2$ Dep3 + $ß_3$ Pov2			
Depression 2	- .00	.02	.865
Depression 3	.06	.02	.000***
Food security 2	- .08	.35	.832
Constant	-1 .22	.56	.028*
Note. $\chi 2$ = 16.00; Nagelkerke R^2=.077, df=3, N=179; p < .001***.			

*p < .05, **p < .01, ***p < .001.

Table 13
Data run #3 check: wave 2 and 3 data

Equation/variables	*B*	*SEB*	p
Model A check: Dep3 = $Ó_0$ + $Ó_1$ Pov2			
Poverty guideline 2	.00	.01	.764
Constant	14.22	1.12	.000***
Note. R^2 = .00; F (1, 243) = .09; p < .764.			
Model B check: Dep3 = $Ó_0$ + $Ó_1$ Pov2+ $Ó_2$ Dep2			
Poverty guideline 2	.01	.01	.510
Depression 2	.11	.07	.132
Constant	11.74	1.91	.000***
Note. R^2 = .01; F (2, 187) = 1.28; p < .280.			
Model C check: Dep3 = $Ó_0$ + $Ó_1$ Pov2+ $Ó_2$ Dep2 + $Ó_3$ age + $Ó_4$ marital status + $Ó_5$ child age			
Poverty guideline 2	.01	.01	.439
Depression 2	.10	.07	.171
Age	- .20	.11	.068
Marital status	- 1.03	.80	.198
Child age	.55	.31	.077
Constant	18.85	4.65	.000***
Note. R^2 = .05; F (5, 181) = 2.00; p < .081.			
Model E check: Dep3 = $Ó_0$ + $Ó_1$ Pov2+ $Ó_2$ Pov3 + $Ó_3$ Dep2			
Poverty guideline 2	.01	.01	.380
Poverty guideline 3	- .02	.01	.097
Depression 2	.12	.07	.117
Constant	13.40	2.15	.000***
Note. R^2 = .03; F (3, 186) = 1.79; p < .150.			

*p < .05, **p < .01, ***p < .001.

Table 14
Data run #4 check: wave 2 and 3 data

Equation/variables	*B*	*SEB*	p
Model A: Pov3 = ß$_0$ + ß$_1$ Dep2			
Depression 2	.01	.58	.984
Constant	129.39	10.63	.000***
Note. R^2 = .00; F (1, 201) = .00; p < .984.			
Model B: Pov3 = ß$_0$ + ß$_1$ Dep2 + ß$_2$ Pov2			
Depression 2	.10	.58	.859
Poverty guideline 2	1.47	.08	.058
Constant	109.86	14.70	.000***
Note. R^2 = .02; F (2, 200) = 1.82; p < .165.			
Model C: Pov3 = ß$_0$ + ß$_1$ Dep2 + ß$_2$ Pov2 + ß$_3$ age + ß$_4$ marital status + ß$_5$ child age			
Depression 2	.14	.58	.806
Poverty guideline 2	.16	.08	.042*
Age	1.66	.84	.050
Marital status	- 7.50	6.11	.221
Child age	- 1.04	2.35	.661
Constant	75.83	36.05	.037*
Note. R^2 = .05; F (5, 193) = 1.92; p < .093.			
Model E: Pov3 = ß$_0$ + ß$_1$ Dep2 + ß$_2$ Dep3 + ß$_3$ Pov2			
Depression 2	.37	.59	.527
Depression 3	- .96	.57	.097
Poverty guideline 2	.15	.08	.056
Constant	119.24	16.45	.000***
Note. R^2 = .03; F (3, 186) = 2.09; p < .103.			

*p < .05, **p < .01, ***p < .001.

Limitations

There are several limitations to this data set that prevent study findings from being generalized, and which have likely constricted an ability to reveal significant results. These data are drawn from a sample of low-income rural residents. The challenges related to finding well paying, stable employment in rural economies, reviewed earlier in this document, present significant difficulties for rural mothers who are trying to

work their way out of poverty. Access to transportation and/or car ownership is a widespread challenge, especially for low-income residents, as is the scarcity of affordable housing. Rural residents who invest in their human capital through education or training have difficulty realizing the rewards of this investment because of the lack of higher-level employment positions in rural economies. A lack of anonymity, lack of mental health resources, and the stigma associated with using them presents an additional barrier for rural residents who might wish to pursue mental health treatment.

While some study respondents reported substantial increases in income, most continued to earn poverty level income throughout the study. Therefore, the range of income among respondents was relatively narrow, which may have limited the ability to associate any change in income with one's level of depressive symptomology. Put simply, there may have not been enough movement in income within which to find a clear association with depression. This could explain why there were hints at results, but not enough substance to declare definitive support for one theory over the other.

Study respondents were parents of young children, so their realm of parenting experience is abbreviated. The data set does not allow exploration of whether depression symptomology is differentially affected by the experience of raising teenagers. Study respondents are also all mothers, so there is not the opportunity to explore how a parent's gender affects levels of depression symptomology. The majority of respondents are Caucasian and Latina, so even representation of racial groups is missing also.

An additional limitation is the data set contains only two measures of depression symptomology, without additional data on other mental health diagnoses. Miech and

colleagues (1999) report a high rate of co-morbidity within epidemiological studies that use the DSM classification system. The CES-D is built using DSM criteria, which defines mental health diagnoses in narrow terms, within which other diagnoses are ruled out. Another classification system may cluster more diagnoses or name a disorder that draws different lines around symptoms. The end result is that many people who experience mental health issues as defined by the DSM are diagnosed with more than one disorder, and information on other disorders are not included in the data set. Those with multiple diagnoses face a more complex recovery, and improvement in their condition is likely delayed due to multiple issues and the therapeutic remedies that accompany them. These questions cannot be explored due to the limitations in the data set.

Discussion

This study began as an effort to understand the relationship between poverty and depression. Reading on the topic revealed a wealth of studies that confirmed, again and again, a strong association between the two. The trend toward testing causal relationships is a relatively new area of research, and the practical applications that stem from what causes what holds appeal. When embarking upon addressing the causal question, the first issue at hand became what poverty measure to use. The data set contains many poverty measures, so determining which measures were most strongly related to depression became the first order of business. After food security and poverty guideline percentage were found to have the strongest relationships, exploration of causal relationships between these measures and depression symptomology was conducted. The study results add to the large body of literature that documents a relationship between depression and poverty. Results pertaining to causal relationships reflect the state of current research – that there is no definitive answer just yet. Results also reflect the complex nature of these issues and the difficulty in trying to make order out of messy concepts.

Why do this study in the first place? Why is it important to pay attention to poverty and depression? It is important to attend to poverty and depression because these two variables combine to create lasting impacts upon children raised in these settings. Being poor is associated with multiple negative outcomes in health, mental health, academic performance, and others. Poor individuals are more likely to experience depression, and young children are more likely to be poor (Mattingly & Stransky, 2010). Parental depression poses a serious risk to millions of children,

especially young children who completely depend upon their parents for nurturing, stimulation and daily care (Vericker, Macomber, & Golden, 2010). Vericker and colleagues report 11% of infants living in poverty have a mother who suffers from depression, and maternal depression is associated with birth complications, unexpected birth outcomes, and babies who are fussy and harder to console. Evidence suggests depression interferes with effective parenting and can lead to poor child development. Poor mothers who are severely depressed are more likely to also struggle with domestic violence and substance abuse. The home environment of young children has been found to have a large impact upon cognitive performance and school achievement (Duncan & Brooks-Gunn, 2000). Depression among low-income women "feeds" childhood mental disorders, and is associated with economic disadvantage as children age into adulthood (Targosz, et al., 2003).

A poor mother's depression has been found to cause delays that affect individuals throughout a lifetime. Attention to poverty and depression could improve outcomes for children, thus promoting the odds of poor children achieving their full potential, and saving untold amounts of money associated with school, community and government efforts to address and remediate development delays and other associated problems. If families are given the tools to address depression early, it is better for all. Knowing how to best detect poverty and where intervention efforts will be most productive would be helpful in designing interventions for low-income parents and children who struggle with depression.

Phase 1

Food security

The results of Phase 1 reveal the food security poverty measure to have the strongest relationship to depression symptomology. This supports other findings in which food insufficiency was linked to respondents meeting DSM III-R criteria for recent major depression (Siefert, Heflin, Corcoran, & Williams, 2001). The relationship between food security and depression is not surprising when one considers the meaning of food in American culture, in addition to the physical experience of regular hunger. Study results support a theory that the regular, basic experience of hunger and lack of food in the cupboard has a high emotional impact. An empty cupboard or refrigerator is a concrete reminder of a parent's inability to provide the most basic of necessities for her family. She fails to take care of her children and herself, in the most fundamental of ways. It precludes the family from fully and easily partaking in a host of socially prescribed events that are part of many cultures and of family life. The taboo associated with not serving enough food or running out of food at a celebration may add an additional layer of stress. Children who experience hunger and poor nourishment may have difficulty in school, as hunger is associated with an inability to concentrate. A hungry child's experience at school could serve as another frequent reminder of food insecurity that has a direct impact on stress and mental health. Food insecurity could take the form of a chronic stressor, which has been linked to significantly higher levels of depressive symptoms among women who receive welfare (Coiro, 2001).

Policy implications. So, how can this finding be used? There may be opportunities to influence policy changes aimed at helping impoverished families. The

current political climate has been working against the funding of social programs such as TANF and others. The "pull yourself up by your bootstraps" mentality forwarded by conservatives includes little appetite to increase government supports for poor families. However, food assistance may be an area of opportunity for policy change – food security is so basic that most wouldn't want to be associated with allowing families to go hungry or starve. If official poverty indicators include a measure of how many people experience food insecurity, there may be more action to address the prevalence of poverty. If the official statistic reported the number of families who couldn't afford enough food, conversations about the redistribution of wealth may be different. Until 2011, the United States has issued only one official measure of poverty, making us an exception among developed nations, as most issue multiple official measures (Meyer & Wallace, 2009). Adding food security as an official poverty measure would promote the awareness of poverty from a new and different angle.

Using food security as a poverty measure sidesteps problems associated with reporting poverty based on TANF receipt, where stories of system fraud and a welfare recipient living too well can come to mind. It also sidesteps problems associated with poverty reporting based on employment status or SES where there is a good deal of variation in how someone might live related to their job title, education, or occupation. Food security is a keener measure of perception than a relative income. Someone may know they have and earn less than others who live around them and will assign their own meaning of what it means for them personally. The regular experience of hunger removes a good deal of the noise associated with perception and goes more directly to the core of experience.

A potential problem with using food security as a poverty measure might be related to parental decision-making. Public opinion has little patience with or sympathy for parents who value cable TV, the purchase of cigarettes or alcohol, and other choices at the expense of feeding their families. While there are families that likely abuse their food support, such criticism should not be applied to all. There are on-going efforts to address an apparent education gap for many parents, and especially among low-income parents who face a choice between food quality and quantity, related to nutrition and food preparation. The Extension Service has offered curricula around this topic for many years, but the need for this type of education far exceeds their ability to recruit in families who can benefit and/or educate a significant proportion of them. These potential pitfalls might also be used to discount research using food security as a poverty measure.

Future research. Food security might be used as a poverty measure in future research, perhaps as an indicator of general family well-being or life satisfaction. The strong relationship with depression revealed in the present study might be an indicator of promise for use in research that includes other mental health conditions. One of the measure's advantages is that hunger is a widely understood concept that might be experienced by a wide range of individuals. Food security taps basic, daily experience. This idea might be applied to other basic experiences, like safe, reliable housing or reliable transportation, to promote the development additional data gathering tools.

Poverty Guideline

The poverty guideline measure was also revealed to have a strong relationship to depression symptomology. The Federal Poverty Guideline, from which the poverty

guideline variable is created, is the tool utilized to determine eligibility for many social programs such as TANF. Since welfare reform was enacted and many families have moved into employment, a sizable segment of those still on welfare struggle with mental health issues. So, the strength shown between the poverty guideline measure and depression symptomology indicates a consistency with the needs of those who remain on TANF. Its strength is also consistent with the well-documented association between poverty and depression, and should lend confidence to the measure. In this materialistic society, it is not a stretch to imagine that a lack of money earned is associated with depression and other mental health issues. An inability to buy things, most importantly food, housing and transportation, also tap daily experience related to basic needs.

Phase 2

The literature on poverty and depression includes recent efforts to explore causal relationships. The research in this area either supports social causation theory, or finds support for both theories operating recursively. No research found for this study reports support for social selection theory alone. Phase 2 results for the current study are in keeping with the state of current literature in this area. The results lean toward support for social causation in models that include food security, but do not provide strong support, and there is no support for social selection theory alone. More research is needed to determine definitive results regarding causal relationships, and there is a need to identify additional influences that bear upon the relationship between poverty and depression.

The relationship between poverty and depression is complex, and the results of

the present study reflect the difficulty that exists in trying to determine a clear cause between one thing and another. In many of the models included in the data runs, the variables included account for a small proportion of variance. This says that variables within the equation have minimal impact upon the dependent variable. But what is missing in the equations? Results reveal they don't include age, marital status, or the age of a youngest child. But might they include events in one's personal history, genetics, learning styles, personality characteristics or something else? Odds are any of these factors might have an important place in determining a cause between poverty and depression, but these factors pose some challenges when they need to be quantified and used in statistical tests. Perhaps a wider accounting for poverty might be effective, for example, by combining poverty status and food insecurity as independent variables in relation to depression.

Theory could guide the choice of variables related to poverty and depression. Human capital theory would view poverty as a lack of financial resources and depression as a mental health deficit, and would guide the inclusion of other assets or deficits related to education, coping skills, or family support, that might be viewed as a strength to build upon or a weakness to address, as intervening or control variables. If they study were approached from a mental health perspective, an approach like narrative therapy would promote the inclusion of variables related to perception, identity, and meaning. Social disease production theory would include demographic variables such as gender, race or social class, which are believed to shape people's behavior and exposure to risk. There is a wide range of possibilities to choose from in trying to eliminate predictive power that is claimed by the constant.

Application of findings

Knowing causal relationships helps when deciding where to direct funding and program services. Following the results in Phase 2, social causation theory implies that efforts to improve the availability and affordability of food should lead to improvement in the rates at which low-income mothers of young children experience depression symptomology. It is possible that improving access to quality food could have the same effect for a larger population. Applying funds to ensure access to quality food could lead to reduced need for mental health services, reduced negative impacts upon child development, and reduced costs associated with services in places that range from schools to medical offices to government agencies.

The exploration of causal relationships aims for practical application of effort. There are many examples of programs offering services to remedy an issue, only to find another issue prevents movement in their area. For example, it is widely believed that education and training are primary components in preparing someone to earn a living wage. The problem for people living in rural areas, and for all people in the economic climate of the late 2000s, is that opportunity for living wage employment is constricted. A lack of opportunity results in intense competition that leaves many who have invested in education or training unable to realize the rewards associated with such efforts. Obtaining skills through education and training may be less effective than other initiatives in certain time periods or in certain geographic settings.

Knowing whether poverty causes depression or depression causes poverty could have practical applications in the fields of mental health or TANF employment services. In the family therapy field, a therapist would be unlikely to work toward improving

parent/child relationships when a parent is actively using chemicals. It is assumed that chemical use is a main contributor to the problem and it needs to be addressed first. Can this line of thought be applied to depression and poverty? Is it ineffectual to seek employment when one suffers from depression? Is it ineffectual to address depression when one is unemployed and poor?

In the world of TANF, it has been widely believed a person must be rehabilitated and trained before they are ready to seek employment. This school of thought is consistent with social selection theory – that depression causes poverty – and can be applied by addressing mental health issues with the belief that such efforts will lead to improvement in employability, and eventually improvement in poverty status. There is now a movement within the employment services field to view employment as part of recovery, that work promotes rehabilitation (and on-the-job training is valuable side-effect). This approach is consistent with social causation theory – that poverty causes depression – and can be applied by addressing poverty status through employment, believing it will lead to improvements in mental health. An application of social causation theory is the Mental Health Supported Employment model (http://mentalhealth.samhsa.gov/cmhs/CommunitySupport/toolkits/employment), an evidence-based practice that is poised to turn past practice on its head. It starts by helping mentally ill individuals secure employment as soon as they express a desire to work, and weaves in attention to mental health issues with on-going mental health support and other core principles. Implicit in the model is that mental health issues improve as a result of being in a job, not necessarily as a result of earning a certain wage, though even small increases in wage have been associated with improved mental health

(Montoya, et. al., 2002). However, the idea that someone needs to be rehabilitated, or that their depression must be cured before they are ready to work, seems to be an idea on its way out the door. Time will tell whether widespread implementation of this approach improves outcomes and/or makes a difference for families who deal with poverty and mental health challenges. Continuing studies on the children of depressed parents will add an important piece to this field of study.

Policy Implications

Policy implications for social causation theory versus social selection theory are reflected in a long history borne out in the vacillating efforts between structural reform and blaming families and communities for being poor. Support for social causation theory lends to efforts for creating structural change. If opportunities are more accessible across the board, poverty would be lessened and, as the theory implies, depression would be reduced. Policy reform is needed to provide wide-scale living wage employment opportunities for all as a way to address poverty. Policy efforts might be aimed at minimum wage reform or tax cuts for low- and middle-income earners so more wages are retained. Economic investments could promote the creation of living wage jobs and small businesses, and fund grants for low-income students at previous levels. Labor market interventions could include tax incentives to lure business and stem the flow of business out of the country, and a multitude of other issues. When it comes to policy implications aimed at reducing poverty, the options are endless.

Future research

Policy efforts aimed at structural reform are often at the core of debate between

political parties as well. The tendency to make decisions based upon research and evidence-based practice is growing, so more research is needed to make the case for structural reform. More research is needed to make the case for addressing poverty as an effective way to impact mental health challenges. Once the NAS measure is implemented, it might be used as a more precise poverty measure in studies that test social causation and social selection theories; though there are challenges in using Census Data when mental health diagnoses are included as variables. NAS recommendations could be implemented with other comprehensive data sets that include detailed data on income and expenditures and mental health indicators.

Finally, further research could include application of the study model with a more representative sample, or with more meaningful control variables. The data for this study was gathered during the time of significant change in how social programs are provided and delivered in the United States. What might that mean for low-income individuals who took part in this study? Did the context have an impact upon their perceptions, feelings of hope, and eventually their mental health? Also, as time went on and some people moved into self-sufficiency, what was the impact upon those who still rely upon social support to make ends meet? Exploring poverty and depression with a wider range of individuals would give a different perspective, and a different statement in relation to results.

The present study reveals it is easier to find clear associations than it is to find causal relationships. This is likely the case with a long list of social issues that affect families, communities, and nations. More research is always needed to add support, discover new directions for thinking, or reaffirm what we know in new and different

ways.

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