The longitudinal relations between depression and parenting self-efficacy in rural mothers with low incomes

Kimberly Dawn Doudna

Iowa State University

Follow this and additional works at: http://lib.dr.iastate.edu/etd

Part of the Psychology Commons

Recommended Citation

Doudna, Kimberly Dawn, "The longitudinal relations between depression and parenting self-efficacy in rural mothers with low incomes" (2012). Graduate Theses and Dissertations. 12658.
http://lib.dr.iastate.edu/etd/12658

This Thesis is brought to you for free and open access by the Graduate College at Iowa State University Digital Repository. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
The longitudinal relations between depression and parenting self-efficacy in rural mothers with low incomes

By

Kimberly D. Doudna

A thesis submitted to the graduate faculty in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Human Development and Family Studies

Program of Study Committee
Kimberly Greder, Major Professor
Clinton Gudmunson
Susan Maude

Iowa State University
Ames, Iowa
2012
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS ........................................................................................................ iii

ABSTRACT ............................................................................................................................ iv

CHAPTER 1: GENERAL INTRODUCTION ............................................................................. 1
  Introduction .......................................................................................................................... 1
  Thesis Organization ............................................................................................................ 2
  Literature Review ............................................................................................................... 3
  References .......................................................................................................................... 7

CHAPTER 2: THE RELATIONS BETWEEN FOOD INSECURITY, DEPRESSION, PARENTING, AND KNOWLEDGE OF COMMUNITY RESOURCES AMONG RURAL MOTHERS WITH LOW-INCOMES: AN INTEGRATIVE MODEL ................................................................. 12
  Abstract ............................................................................................................................ 12
  Introduction ...................................................................................................................... 12
  Methods ............................................................................................................................ 20
  Results ............................................................................................................................... 24
  Discussion ........................................................................................................................ 30
  References ........................................................................................................................ 33

CHAPTER 3: THE RELATIONS BETWEEN DEPRESSIVE SYMPTOMATOLOGY, PARENTING SELF-EFFICACY, FAMILY FUNCTIONING AND FINANCIAL PRESSURE AMONG RURAL MOTHERS WITH LOW-INCOMES ......................................................................................... 40
  Abstract ............................................................................................................................ 40
  Introduction ...................................................................................................................... 40
  Methods ............................................................................................................................ 45

  Data Collection ............................................................................................................... 46
  Results ............................................................................................................................... 48
  Discussion ........................................................................................................................ 52
  References ........................................................................................................................ 54

CHAPTER 4: GENERAL CONCLUSIONS ............................................................................. 59
  General Discussion ......................................................................................................... 59
  Recommendations for Future Research ....................................................................... 61

APPENDIX ........................................................................................................................... 63
ACKNOWLEDGEMENTS

This research was supported in part by USDA/CSREES/NRICGP Grants - 2001-35401-10215, 2002-35401-11591, 2004-35401-14938, and a Special Research Initiation Grant (SPRING), Extension to Families and the Department of Human Development and Family Studies, Iowa State University, Ames. Data were collected in conjunction with the cooperative multi-state research project NC-223/NC-1011 Rural Low-income families: Tracking Their Well-being and Functioning in the Context of Welfare Reform. Cooperating states were California, Colorado, Indiana, Iowa, Kentucky, Louisiana, Massachusetts, Maryland, Michigan, Minnesota, Nebraska, New Hampshire, New York, Ohio, Oregon, South Dakota, West Virginia, and Wyoming.
ABSTRACT

This thesis examined depression and parenting self-efficacy in context with individual and family variables, in two different studies. Data were aggregated from a multi-state, longitudinal research project that examined the effects of the 1996 welfare reform on the functioning and well-being of rural families with low household incomes. Both studies used path analysis to determine the relations between variables, and test for moderation effects. The first study examined relations between food insecurity, depression, parenting self-efficacy and perceived parenting support, with knowledge of community resources acting as a moderator. The second study examined relations between depression, parenting self-efficacy and family functioning, with financial pressure as a moderator. The results showed that depression and food insecurity predict each other over time, and that depression negatively affects parenting self-efficacy, perceived parenting support, and family functioning. Knowledge of community resources and financial pressure were found to be moderators of specific paths in the models. These results suggest that rural families with low income, especially those who experience financial pressure, would benefit from mental health services that address maternal depression within the context of the family. Additionally, since depression and food insecurity are linked, mental health professionals should consider making families aware of food assistance programs for which they may qualify, and food assistance program personnel may consider partnering with mental health professionals.
CHAPTER 1: GENERAL INTRODUCTION

Introduction

In 2010, 16.5% of the population living in rural areas was poor (Economic Research Service, 2011). In contrast, 14.9% of people in metropolitan areas were poor (Economic Research Service, 2011). In this thesis, rural is defined using Butler and Beale’s (1994) county coding continuum, which takes into account population size and adjacency to metropolitan areas. Although the rate of poverty in rural areas is higher than the metropolitan rate, not as much empirical research has been conducted to learn more about families with low-income who reside in rural areas. It is important to learn about the circumstances of rural families in order to better shape public policy.

Families with low-income living in rural areas differ from families with low-income living in metropolitan areas in several ways. Thus, policy makers must take into account these differences when designing policies that affect families with low-income. For example, resources such as health care and grocery stores may be more difficult to access for rural families because of distance to the resource (Garasky, Morton & Greder, 2006). In addition to the barrier of distance, a lack of transportation has been found to be another barrier that limits access to resources (Fletcher, Garasky, & Nielsen, 2005; Garasky, Morton & Greder, 2006). Another way rural and non-rural residents differ is access to employment. In rural areas, there are often fewer jobs available (Jensen, 2006). This fact is significant in light of the 1996 federal welfare reform, known as the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA). Part of PRWORA requires people who receive assistance through Temporary Assistance to Needy Families (TANF) to be involved in work or work-like activities.
Thesis Organization

This thesis consists of four chapters: (a) Chapter 1: General Introduction, (b) Chapter 2: The Relations between Food Insecurity, Depression, Parenting and Knowledge of Community Resources in Mothers with Low-income Living in Rural Areas, (c) Chapter 3: Depression, Parenting, Personal Well-being and Financial Pressure in Mothers with Low-income Living in Rural Areas, (d) Chapter 4: General Conclusions.

Chapter 1 consists of (a) Introduction, (b) Thesis Organization, (c) Literature Review, (d) Rural Families Speak Study, and (e) References. Chapters 2 and 3 are manuscripts to be submitted to The Journal of Family Relations. Chapter 2: The Relations Between Food Insecurity, Depression, Parenting, and Knowledge of Community Resources Among Rural Mothers With Low-incomes: an Integrative Model contains the following sections: (a) Abstract, (b) Introduction, (c) Methods, (d) Results, (e) Discussion and (f) References. The second manuscript, Chapter 3: The Relations Between Depressive Symptomology, Parenting Self-efficacy, Family Functioning and Financial Pressure Among Rural Mothers With Low-incomes contains the same six elements as Chapter 2.

Chapter 4: General Conclusions will consist of a summation of the results and discussion about depression and parenting self-efficacy among mothers with low income living in rural areas. General Conclusions is comprised of the following: (a) General Discussion, and (b) Recommendations for Future Research.
Literature Review

Risk and Resilience Theory

Resilience can be defined as an individual or family “doing well in the face of adversity” (Patterson, 2002a, p. 350). Resilience can be viewed not only as a trait that some individuals possess, but also as a process (Patterson, 2002a). A family that experiences risks but still has positive outcomes is referred to as having family resilience (Patterson, 2002a).

There are three contexts to consider when evaluating resilience in children and adolescents, (a) individual, (b) family, (c) extra familial (Masten & Coatsworth, 1998). While Masten and Coatsworth (1998) examined resilience in young individuals, Patterson (2002a) extends their use of the three contexts to examine family resilience.

In order for family resilience to be examined, a family level outcome must be present (Patterson, 2002b). A family level outcome consists of two or more family members (Patterson, 2002b). In the current studies, parenting self-efficacy could be viewed as a family level outcome, because it involves the parent and the child. Finally, family functioning can be seen as a family outcome because it involves the members of the family.

Greene (2002) outlines thirteen basic assumptions of risk and resilience theory. The following assumptions are of particular salience to the current study: (a) “resilience occurs across the life course with individuals, families, and communities experiencing unique paths of development”, (b) “resilience is linked to life stress and people’s unique coping capacity”, (c) “may be on a continuum – a polar opposite to risk”, (d) “may be interactive, having an effect in combination with risk factors”, and (e) “is enhanced through connection or relatedness with others”.

There are two major perspectives related to which families can be deemed resilient. First, some (Masten & Coatsworth, 1998) argue that significant risk must be experienced by a family in order for the family to be judged as resilient or not. Second, others view life as risky in general and therefore all families can be categorized as resilient or not (Benard, 1999; Walsh, 1998).

In their review of key protective factors related to family resiliency, Benzies and Mychasiuk (2009) use the same three categories as Masten and Coatsworth (1998), individual, family and community. Among the many key protective factors that they identify, the following are related to the current study: On the individual level- self-efficacy, on the family level- family cohesion, supportive parent-child interaction, and social support and on the community level – supportive mentors.

Although Criss, Pettit, Bates, Dodge and Lapp (2002) do not frame their outcome variable according to the propositions outlined by Patterson (2002b), they did find that at high levels of positive peer relationships moderated the relation between family adversity and child externalizing behaviors, in that that link was no longer statistically significant. Orthner, Jones-Sanpei and Williamson (2004) followed Patterson’s (2002) guidelines more closely, in that they looked at what predicted positive outcomes for families with low incomes. They found that communication, problem solving, and social support were predictors of positive outcomes for these families.

Maternal Depression

In general, depression is a mental condition that includes the symptoms of sadness, loss of interest in previously enjoyable activities, guilt, altered sleep patterns and difficulty concentrating (World Health Organization, 2010). This condition affects from 6.8% to 8.7%
of the U.S. population (Reeves et al., 2011). Women (Odom & Vernon-Feagans, 2010) who are single comprise a large percentage of those affected, and experience maternal depression during their child’s early years (Hammen, 2003; Jones & Ford, 2008; Odom & Vernon-Feagans, 2010). More than 33% of rural families headed by a woman in the workforce have low incomes, (Lichter & Jensen, 2002) which increases the risk of depression. The impact of maternal depression does not begin and end within the individual. Rather, maternal depression affects fundamental aspects of the mother’s life. Maternal depression is associated with food insecurity (Casey et al., 2004; Melchoir et al., 2009). Lent, Petrovic, Swanson and Olson (2009), found that depression can lead to unemployment, and therefore a decrease in income, with the consequence of food insecurity. However, Huddleston-Casas, Charnigo and Simmons (2008) found the relationship between food insecurity and maternal depression to be bidirectional, suggesting that for some mothers, depression can lead to food insecurity and for other mothers, food insecurity can lead to depression. Maternal depression affects a mother’s ability to parent (Gotlib & Goodman, 1999; Kiernan & Huerta, 2008), and is associated with a decrease in empathy and emotional responsiveness toward their children when compared to non-depressed mothers (Silberg & Rutter, 2002). On the other hand, maternal depression was not found to be associated with less engagement in unmarried families (Turney, 2010). However, the population used in that study was mothers living in urban areas. Not only is the population non-rural, Turney’s (2010) findings do not provide a causal link, which merits further examination of maternal depression and parenting in a population of mothers living in rural areas. Although researchers continue to explore the risks of maternal depression among mothers with low-income living in rural areas, very few
researchers have examined the effects of maternal depression on parental self-efficacy in the rural context.

**Parenting Self-efficacy**

Family health problems were found to be negatively associated with parenting self-efficacy and social support was positively associated with parenting self-efficacy in a study of mothers with young children living in rural areas with low-incomes (Ontai, Sano, Hatton & Conger, 2008). In a study of mothers identified as African-American, living in rural areas, the link between parenting self-efficacy and parental behavior is hinged upon the mother setting developmental goals for her child (Brody, Flor & Gibson, 1999).

**Purpose of This Thesis**

The purpose of this thesis is to better understand the relations between depression and parenting self-efficacy and other related individual and family level variables in rural mothers with low incomes and young children. This thesis uses two longitudinal studies to explore the long-term effects of depression in relation to other variables, especially parenting self-efficacy, in a risk and resilience framework. The following research questions expand the knowledge base of how depression acts as a risk that affects rural low-income mothers over time:

1. What are the relations between depression, food insecurity, parenting self-efficacy, and perceived parenting support among rural mothers with low-incomes?

2. Does knowledge of community resources moderate the relations between depression, food insecurity, parenting self-efficacy, and perceived parenting support among rural mothers with low-incomes?
3. What are the relations between depression, parenting self-efficacy and family functioning among rural mothers with low-incomes?

4. Does financial pressure moderate the relations between depression and parenting self-efficacy among rural women with low-income?

*Rural Families Speak Study*

*Rural Families Speak* is a multi-state longitudinal study of rural low income families (Bauer, 2004; Bauer & Katras, 2007). Study participation requirements included: (a) being a mother of at least eighteen years of age to a child aged twelve or under who resides in the home, (b) live in a household at or below 200% of the federal poverty line, (c) reside in a county with a population ranging from 2,500 to 19,000 and considered rural by Butler and Beale (1994).

*Data Collection*

Annual semi-structured interviews were conducted with mothers in places that were comfortable to them, such as their home. The audio recorded interviews lasted from approximately 90 to 120 minutes and included both quantitative and qualitative data about their household composition, income, household expenses, housing, food security status, physical and mental health, social support and parenting.

*References*


http://www.who.int/mental_health/management/depression/definition/en/
CHAPTER 2: THE RELATIONS BETWEEN FOOD INSECURITY, DEPRESSION, PARENTING, AND KNOWLEDGE OF COMMUNITY RESOURCES AMONG RURAL MOTHERS WITH LOW-INCOMES: AN INTEGRATIVE MODEL

Kimberly D. Doudna, Angelica Reina, Kimberly A. Greder

Abstract

Risk and resilience theory was used to examine the relations between food insecurity, depression, parenting self-efficacy, perceived parenting support, and knowledge of community resources. Data from NC 1011, ‘Rural Families Speak’, were analyzed using path analysis for 314 rural mothers with low incomes. Results show that food insecurity and depression in Wave 1 are positively associated with depression in Wave 2, and depression in Wave 2 is negatively associated with perceived parenting support and parenting self-efficacy in Wave 2. A mother’s knowledge of community resources in Wave 1 was found to moderate the relation between depression in Wave 1 and perceived parenting support in Wave 2, and the relation between food insecurity in Wave 1 and parenting self-efficacy in Wave 2. Policy implications regarding food insecurity, depression and parenting are discussed.

Introduction

The United States is commonly viewed as a nation of plenty, including an abundance of food and money. While this is true for some people in the U.S., it is not true for all U.S. residents. The poverty rate for the United States in 2000 was 11.3 percent (Dalaker, 2001) and grew to 15.1 in 2010 (DeNavas-Walt, Proctor & Smith, 2011).
Food insecurity and depression are more prevalent among households experiencing poverty than other households. Additionally, rural families with low-incomes are at greater risk for food insecurity and depression due to lack of access to grocery stores (Hofferth & Iceland, 1998; Morton, Bitto, Oakland, & Sand, 2005) and mental health services (Gustafson, Preston, & Hudson, 2009). Thus, rural families with low-incomes may face greater hardships in raising children compared to their urban counterparts.

The researchers hypothesize that food insecurity and depression are negatively associated with parenting self-efficacy and perceived social support. A second hypothesis is that a mother’s knowledge of community resources may moderate the relations between all of the variables in the model. The conceptual model in Figures 1 and 2 illustrate the hypothesized relations between these variables.

*Food Insecurity*

In 2011, nearly 45 million people received food assistance from the Supplemental Nutrition Assistance Program (SNAP) (USDA, 2012). Food is a universal need, but not all families have enough food to fulfill their need. Food insecurity is defined as “whenever the availability of nutritionally adequate and safe food or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain” (Anderson, 1990, p. 1560).

Families with low-incomes differ in the ways they meet their food needs depending on their location (Hofferth & Iceland, 1998). Hofferth and Iceland (1998) found that rural families were more likely to receive monetary assistance from relatives
Figure 1. Conceptual Risk-Resilience Model.
than were urban families. Rural families with low-income access formal supports such as SNAP less often than low-income urban families (Rank & Hirschl, 1993; Jensen & Eggebeen, 1994). Swanson et al. (2008) found the differences in how urban and rural families with low-incomes access social support to meet their food needs might be due to inadequate formal supports in rural areas. These differences are important to examine in order to inform the development of policies that support rural families with low-incomes who are food insecure.
Social support alone cannot alleviate food insecurity, as there are families in the U.S. who are food insecure even though they access high levels of social support (Swanson, et al, 2008). Stevens (2010) found that when young mothers shared food with other low-income family members the mothers ran out of food. Reciprocity plays a key role in the social support systems of rural individuals with low-incomes (Morton, Bitto, Oakland, & Sand, 2008). Rural individuals with low-incomes are more likely to give and receive food from friends, family and neighbors than urban individuals with low-incomes (Morton et al., 2008). However, Morton et al. (2005) found that giving food to family and friends was not significantly related to food insecurity status in rural Iowans. Thus, the construct of social support in regard to food insecurity is complex, comprised of both positive and negative aspects.

Risk and Resilience Theory

The term, resilience, has been associated with an individual or family “doing well in the face of adversity” (Patterson 2002, p. 350). Resilience is distinct from resiliency; it is a process (Patterson, 2002). Resiliency, on the other hand, refers to a trait an individual possesses, and is a term often used by practitioners (Patterson, 2002). Family resilience refers to the family’s ability to experience risks, but still have positive outcomes (Patterson, 2002). Masten and Coatsworth (1998) outlined three contexts (i.e., individual, family, extra familial) that are necessary to consider when evaluating resilience in children and adolescents. Masten and Coatsworth (1998) were primarily concerned with resilience in individuals, whereas Patterson (2002) applied the conditions to analyze family resilience.
Protective mechanisms are a part of resilience theory. A protective mechanism shields an individual or family from a negative outcome that may stem from risks experienced by the individual or family. Protective mechanisms act as moderators that change the family outcome in relation to experienced risks (Patterson, 2002). Protective mechanisms can be found on three main levels, in the individual, in the family and in the community (Patterson, 2002). Knowledge of community resources, which requires an interaction between the family and the community, is a protective measure that falls between the categories of family and community as described by Patterson (2002). Knowledge of community resources is a protective measure because it assists low-income rural families in gaining access to additional monetary or social support, thus buffering them from implications of stressors and risks. Whereas community resources offer formal supports, low-income rural families typically rely on informal social support to help meet their needs (Morton et al., 2005, Sano et al. 2011). Therefore, from a policy perspective it is important to discern whether or not knowledge of community resources buffer the effects of the risks of food insecurity and depression.

Ashiabi and O’Neal (2008) contend that food insecurity is a stressor that decreases the quality of parenting, which in turn decreases the quality of outcomes for the children. Food insecurity has been shown to decrease both the physical (Tarasuk, 2001) and the mental health of parents (Weinreb et al., 2002; Vozoris & Tarasuk, 2003). This is important because mental illness in parents has been linked to lower quality of care for children (Bettes, 1988). Young mothers who are food insecure will often skip
meals to ensure that their children have enough to eat (Stevens, 2010). This behavior could also affect parenting abilities due to irritability and anxiety caused by skipping meals (Alaimo, 2001).

Depression is a mental condition that includes the symptoms of sadness, loss of interest in previously enjoyable activities, guilt, altered sleep patterns and difficulty concentrating (World Health Organization, 2010). Depression is a mental health condition that affects nearly 20% of the U.S. population (Centers for Disease Control and Prevention, 2006); a large percentage consisting of women (Odom & Vernon-Feagans, 2010) who are single who experience maternal depression during the early years of childrearing (Hammen, 2003b; Jones & Ford, 2008; Odom & Vernon-Feagans, 2010). Over one third of rural families headed by working mothers are poor (Lichter and Jensen, 2002) which places them at high risk for depression. The consequences of maternal depression are extensive and substantial. For example, Casey et al. (2004) found that maternal depression was associated with food insecurity. The relationship between these two variables “lies in the direction of poor mental health leading to a reduction in household income through unemployment, with the consequence of food insecurity” (Lent, 2009, p. 653). In contrast, the relationship between food insecurity and depression has been found to be bidirectional in a study of rural mothers, suggesting that mothers who are depressed may become food insecure and that mothers who are food insecure may become depressed (Huddleston-Casas, Charnigo & Simmons, 2008). Although researchers continue to address the risks of depression among women with low-income who live in rural environments, very few studies have
looked at the effects of maternal depression on parental confidence in the rural context. Previous research indicates that depressed mothers lack the capacity to parent adequately (Gotlib and Goodman, 1999), and are less empathetic or less emotionally responsive to their children than mothers who are not depressed (Silberg and Rutter, 2002). Conversely, Turney (2010) found little evidence that maternal depression was associated with less engagement in families with unmarried parents. However, the analyses did not provide actual causal conclusions about the effects of maternal depression on parenting behaviors. Turney's conclusions merit attention for further research on this area.

**Parenting Self-efficacy and Practice**

Self-efficacy is the situation or task specific confidence one has in his or her ability to achieve a task (Bandura & Cervone, 1986). One’s self-efficacy is one of the most salient predictors of behavior and is a central mechanism underlying behavior change (Bandura & Cervone, 1986). Ontai, Sano, Hatton, and Conger (2008) found that parenting efficacy of rural mothers with low-incomes with young children was significantly influenced by family health problems and social support. There is a link between parent efficacy beliefs and parental behavior (Brody, Flor & Gibson, 1999). Efficacious parental beliefs were linked indirectly to parental practices in rural African American mothers (Brody, et al, 1999). With greater efficacy, mothers were more likely to encourage developmental goals for their children academically and psychosocially. This increase in developmental goals improved the use of parenting practices that encouraged this development. Improved competence beliefs of the parents were linked
to outcomes in their children, specifically improved academic competence and psychosocial competence.

Methods

Participants

The sample in this study was drawn from the multi-state longitudinal study of rural low-income families, *Rural Families Speak* (Bauer, 2004; Bauer & Katras, 2007). Data from Panels 1, 2, and 3 from Waves 1 and 2 was used for this study (N = 314). Table 1 provides information about the states in each Panel and Wave. The unit of analysis in this study is the family, however, mothers were the respondents. To participate in the study, mothers had to have a child age 12 or under, be at least 18 years of age, and live in a household at or below 200% of the federal poverty line. The mothers in the current study were on average, nearly 30 years old ($M = 29.82, SD = 7.37$). Mothers had on average, approximately two children, ($M = 2.35, SD = 1.27$). Additionally, mothers had to live in counties considered rural, with populations ranging from 2,500 to 19,999. Racial and ethnic origins of mothers included Non-Hispanic-white (63.1%), Hispanic/Latino (23.2%), African American (7%), Native American (1.3%), multi-racial (4.1%), other (0.3%) and three participants had missing data for this question (1%). Marital status of the mothers included married (45.5%), living with partner (15.9%), single (21%), divorced (11.5%) and separated (6.1%). Mothers educational level included 8th grade or less (10.5%), some high school (17.6%), high school or GED (29.1%), specialized technical, business or vocational training (14.4%), some college (25.2%), college or university graduate (2.6%), and graduate degree (0.6%).
Data Collection

In-person interviews using a semi-structured protocol were conducted annually with mothers in locations convenient to them (e.g., their home) and were audio recorded, and transcribed verbatim. The interviews lasted approximately 90-120 minutes and yielded both quantitative and qualitative data about participants’ household composition, physical and mental health, food security status, housing, household expenses, income, attitudes about and experiences with welfare reform, social support, and parenting.

Table 1. Waves, Panels and States in Rural Families Speak.

<table>
<thead>
<tr>
<th>Wave 1 Panel 1</th>
<th>Wave 1 Panel 2</th>
<th>Wave 1 Panel 3</th>
<th>Wave 2 Panel 1</th>
<th>Wave 2 Panel 2</th>
<th>Wave 2 Panel 3</th>
<th>Wave 3 Panel 1</th>
<th>Wave 3 Panel 2</th>
<th>Wave 3 Panel 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA, IN,</td>
<td>WV</td>
<td>IA,</td>
<td>CA, IN,</td>
<td>WV</td>
<td>IA</td>
<td>CA, IN,</td>
<td>WV</td>
<td>IA</td>
</tr>
<tr>
<td>KY, LA,</td>
<td>SD</td>
<td>KY, LA,</td>
<td>MA, MD,</td>
<td>MD,</td>
<td>MA, MD,</td>
<td>MI, MN,</td>
<td>MI, MN,</td>
<td>NE, NH,</td>
</tr>
<tr>
<td>MA, MD,</td>
<td></td>
<td>MA, MD,</td>
<td>MI, MN,</td>
<td></td>
<td>MI, MN,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MI, MN,</td>
<td></td>
<td></td>
<td>NE, NH,</td>
<td></td>
<td></td>
<td>NY, OH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE, NH,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OR, WY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NY, OH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NY, OH</td>
<td></td>
</tr>
<tr>
<td>OR, WY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OR, WY</td>
<td></td>
</tr>
</tbody>
</table>

Measures

Food security is the sum score of the 18-item U.S. Household Food Security Module (Hamilton et al., 1997). The Food Security Module contains yes/no questions such as (a) In the last 12 months, since last (name of current month), did you (or other adults in your household) ever cut the size of a meal, or skip meals because there wasn’t enough money for food? (b) In the last 12 months, (was your child/were the children)
ever hungry but you just couldn’t afford more food?, and (c) In the last 12 months, did (your child/any of the children) ever not eat for a whole day because there wasn’t enough money for food?

Depressive symptomology was measured using the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977). The CES-D contains 20 items on a Likert scale ranging from 0 (rarely or none of the time) to 3 (most or all of the time) (α = 0.91, n = 295). Types of questions in the CES-D include: I felt lonely, I could not shake the blues, I could not get going, and people were unfriendly.

Two variables were included as controls. Mother’s education level was on a scale from 1 (8th grade or less) to 8 (graduate degree). Total number of children was the number of children reported to be living in the household at Wave 1.

The sum score of seven questions were used to measure parental confidence. The sum score of six questions were used to measure perceived parenting support. The questions about parental confidence and support were adapted from the Oregon Healthy Start Parent Ladder (Pratt, McGuigan, & Katzen, 2000). Participants responded to questions pertaining to parenting self-efficacy and parenting support on a Likert type scale that ranged from 0 (no agreement) to 6 (high level of agreement). Cronbach’s alpha was .66 (n = 301) for parenting self-efficacy and .83 (n = 306) for parental support. The seven items about parenting confidence included statements such as ‘Your confidence that you know what is right for your child’, ‘Your ability to create a safe home for your child’, ‘Your ability to find fun activities of interest to your child’, and ‘Your knowledge of children’s growth and development’. The six items about parenting support included
statement such as ‘Other parents to talk to’, ‘Someone to offer helpful advice or moral support’ and ‘Professionals to talk to’.

Knowledge of community resources (Richards, Pamulpati, Corson & Merrill, 2000) is the sum of twenty-two questions in which participants responded either yes or no. Questions were related to the participant’s knowledge about how to access different resources, such as help with heating bills, subsidized housing, how to find a mental health counselor, and how to apply for SNAP or WIC.

Analysis

To examine the relations between the variables, Model 1 was tested using path analysis in AMOS. Paths from each exogenous variable (food insecurity Wave 1, depression Wave 1, total number of children and education level) to the endogenous variables of food insecurity Wave 2 and CES-D Wave 2 were included. Paths from food insecurity Wave 1 and CES-D Wave 1 to parenting self-efficacy and parenting support were included. Finally, a path from perceived parenting support Wave 2 to parental confidence Wave 2 was included.

Model 1 was then tested using two groups: (a) participants with high levels of knowledge of community resources (n=120) and (b) participants with low levels of knowledge of community resources (n=109). The median sum score of knowledge of community resources was used to create the two groups. Participants with the median score of 18 and above comprised the high group, while participants with a score of 17 and below comprised the low group. Using the populations of high and low levels of knowledge of resources in the community, bivariate correlations were run for all
variables in the model. T-tests were also performed to determine if there were
differences in the scores on the measures.

To determine if knowledge of community resources was a moderating variable,
critical ratios for difference were computed in AMOS and then from the pairwise
comparison matrix generated in Amos, z-scores were created and compared with the
critical z-score to determine if moderation occurred.

Results

Descriptive statistics related to the measures for food insecurity, depressive
symptomology, parenting self-efficacy, perceived parenting support and knowledge of
community resources can be found in Table 2. Results for the bivariate correlations
between all variables can be found in Table 3. None of the t-tests were significant.

| Table 2. Means and Standard Deviations Measures Moderated by Knowledge of Community Resources. |
|-----------------------------------------------|-----------------------------------------------|
|                                      | **High Knowledge** |                                      | **Low Knowledge** |
|                                      | **M**  | **SD** | **M**  | **SD** |
| Food insecurity W1                   | 3.6    | 3.86   | 3.09   | 3.76   |
| Food insecurity W2                   | 3.01   | 3.53   | 2.48   | 3.37   |
| Depression W1                        | 17.35  | 11.47  | 16.83  | 10.34  |
| Depression W2                        | 14.42  | 11.09  | 15.94  | 11.74  |
| Parental support                      | 27.63  | 6.91   | 27.07  | 6.46   |
| Parental confidence                  | 31.06  | 4.96   | 30.71  | 5.11   |
| Knowledge of community resources     | 20.48  | 1.30   | 12.29  | 3.79   |
The results of the model for the entire sample (N = 314) are shown in Table 3. The \( \chi^2 \) for the model was 4.914 with df = 5 (\( p = .426 \)). The model fit the data very well in terms of CFI = 1.00, and RMSEA = .000. The following paths were significant, food insecurity at Wave 1 to depression at Wave 2, depression at Wave 1 to food insecurity at Wave 2, depression Wave 2 to perceived parenting support and parenting self-efficacy, and perceived parenting support to parenting self-efficacy, supporting the hypothesis that food insecurity and depression negatively impact parenting self-efficacy and perceived parenting support and that perceived parenting support is positively related to parenting self-efficacy. Food insecurity at Wave 1 was found to predict

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-16</td>
<td>.22*</td>
<td>.18</td>
<td>-05</td>
<td>-.04</td>
<td>-.23*</td>
<td>-.09</td>
<td>-.10</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>-13</td>
<td>-.01</td>
<td>-.10</td>
<td>-15</td>
<td>1</td>
<td>.63**</td>
<td>-.42**</td>
</tr>
<tr>
<td>3</td>
<td>-.05</td>
<td>-.17</td>
<td>1</td>
<td>.55**</td>
<td>.29**</td>
<td>.42**</td>
<td>-.26**</td>
<td>-.26**</td>
</tr>
<tr>
<td>4</td>
<td>-.02</td>
<td>-.16</td>
<td>.61**</td>
<td>1</td>
<td>.33**</td>
<td>.38**</td>
<td>-.21*</td>
<td>-.24*</td>
</tr>
<tr>
<td>5</td>
<td>-.10</td>
<td>-.05</td>
<td>.40**</td>
<td>.25*</td>
<td>1</td>
<td>.62**</td>
<td>-.27**</td>
<td>-.34**</td>
</tr>
<tr>
<td>6</td>
<td>-.10</td>
<td>-.04</td>
<td>.39**</td>
<td>.20*</td>
<td>.63**</td>
<td>1</td>
<td>-.42**</td>
<td>-.43**</td>
</tr>
<tr>
<td>7</td>
<td>-08</td>
<td>-.02</td>
<td>-.23*</td>
<td>-.13</td>
<td>-.40**</td>
<td>-.38**</td>
<td>1</td>
<td>.47**</td>
</tr>
<tr>
<td>8</td>
<td>-02</td>
<td>-.00</td>
<td>-.09</td>
<td>-.10</td>
<td>-.28**</td>
<td>-.47**</td>
<td>.50**</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>-.07</td>
<td>.14</td>
<td>-.04</td>
<td>-.10</td>
<td>-.04</td>
<td>-.01</td>
<td>-.09</td>
<td>-.18</td>
</tr>
</tbody>
</table>

* \( p < 0.05 \) (2-tailed). ** \( p < 0.01 \) (2-tailed).
depression at Wave 2, $\beta = .221, p < .001$, which indicates that the more food insecure a participant was, the more symptoms of depression they experienced. Food insecurity at Wave 1 was also found to predict food insecurity at Wave 2, $\beta = .523, p < .001$. Depression at Wave 1 was found to predict food insecurity at Wave 2, $\beta = .116, p < .05$, which indicates that the more symptoms of depression participants experienced in Wave 1, the more food insecure they were in Wave 2. Depression at Wave 1 was also found to predict depression at Wave 2, $\beta = .452, p < .001$. Depression at Wave 2 was found to predict perceived parenting support at Wave 2, $\beta = -.287, p < .001$, and parenting self-efficacy at Wave 2, $\beta = -.300, p < .001$, which indicates that the more symptoms of depression participants experienced, the more their levels of perceived support and confidence were decreased. Finally, perceived levels of parenting support at Wave 2 predicted parenting self-efficacy at Wave 2, $\beta = .306, p < .001$, which indicates that participants with higher levels of perceived support in the parenting role were more likely to feel confident as a parent. Thirty-three percent of the variance in depression at Wave 2 is explained by food insecurity at Wave 1 and depression at Wave 1 ($R^2 = .327$). Thirty-three percent of the variance in food insecurity at Wave 2 is explained by food insecurity at Wave 1 and depression at Wave 1 ($R^2 = .330$). Sixteen percent of the variance in perceived parental support is explained by food insecurity at wave 1 and 2, and depression at wave 1 and 2 ($R^2 = .161$). Twenty-seven percent of the variance in parenting self-efficacy is explained by food insecurity at Wave 1 and 2, depression at Wave 1 and 2, and perceived parental support ($R^2 = .266$).
Contrary to the hypothesis that the knowledge of community resources would moderate all relations, results indicated that the knowledge of community resources had a moderating effect on two of the relations, depression at wave 1 to perceived parenting support at Wave 2 and food insecurity at wave 1 to parenting self-efficacy at
Wave 2. The $\chi^2$ for the model was 15.462 with $df = 10$ ($p = .116$). The model fit the data very well, CFI = 0.983, RMSEA = .049.

Table 4. *Results for the Final Model.*

<table>
<thead>
<tr>
<th>Paths</th>
<th>Estimate</th>
<th>SE</th>
<th>Standardized estimate</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td># children to FI W2</td>
<td>-0.013</td>
<td>.136</td>
<td>-0.005</td>
<td>.925</td>
</tr>
<tr>
<td># children to Depression W2</td>
<td>-0.526</td>
<td>.431</td>
<td>-0.060</td>
<td>.223</td>
</tr>
<tr>
<td>Education level to FI W2</td>
<td>-0.020</td>
<td>.121</td>
<td>-0.008</td>
<td>.867</td>
</tr>
<tr>
<td>Education level to Depression W2</td>
<td>-0.030</td>
<td>.381</td>
<td>-0.004</td>
<td>.937</td>
</tr>
<tr>
<td>FI W1 to FI W2</td>
<td>0.478</td>
<td>.048</td>
<td>0.523</td>
<td>***</td>
</tr>
<tr>
<td>FI W1 to Depression W2</td>
<td>0.636</td>
<td>.153</td>
<td>0.221</td>
<td>***</td>
</tr>
<tr>
<td>Depression W1 to FI W2</td>
<td>0.036</td>
<td>.016</td>
<td>0.116</td>
<td>.027*</td>
</tr>
<tr>
<td>Depression W1 to Depression W2</td>
<td>0.434</td>
<td>.050</td>
<td>0.452</td>
<td>***</td>
</tr>
<tr>
<td>FI W1 to parent support</td>
<td>-0.145</td>
<td>.119</td>
<td>-0.084</td>
<td>.224</td>
</tr>
<tr>
<td>FI W1 to parenting efficacy</td>
<td>0.145</td>
<td>.084</td>
<td>0.133</td>
<td>.083</td>
</tr>
<tr>
<td>Depression W1 to parent support</td>
<td>-0.074</td>
<td>.038</td>
<td>-0.128</td>
<td>.053</td>
</tr>
<tr>
<td>Depression W1 to parenting efficacy</td>
<td>-0.015</td>
<td>.027</td>
<td>-0.035</td>
<td>.577</td>
</tr>
<tr>
<td>FI W2 to parent support</td>
<td>0.058</td>
<td>.125</td>
<td>0.031</td>
<td>.643</td>
</tr>
<tr>
<td>FI W2 to parenting efficacy</td>
<td>-0.148</td>
<td>.087</td>
<td>-0.105</td>
<td>.091</td>
</tr>
<tr>
<td>Depression W2 to parent support</td>
<td>-0.172</td>
<td>.039</td>
<td>-0.287</td>
<td>***</td>
</tr>
<tr>
<td>Depression W2 to parenting efficacy</td>
<td>-0.134</td>
<td>.029</td>
<td>-0.300</td>
<td>***</td>
</tr>
<tr>
<td>Parent support to parenting efficacy</td>
<td>0.228</td>
<td>.041</td>
<td>0.306</td>
<td>***</td>
</tr>
</tbody>
</table>

* $p < 0.05$.
*** $p < 0.001$

Note. FI=Food insecurity
Table 5. Standardized Estimates of the Final Model, Moderated by Knowledge of Community Resources.

<table>
<thead>
<tr>
<th>Paths</th>
<th>Low level of resource knowledge</th>
<th>High level of resource knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standardized estimate</td>
<td>P</td>
</tr>
<tr>
<td># children to FI W2</td>
<td>.004 .954</td>
<td>.093 .259</td>
</tr>
<tr>
<td># children to depression W2</td>
<td>.000 .997</td>
<td>.023 .759</td>
</tr>
<tr>
<td>education level to FI W2</td>
<td>-.055 .480</td>
<td>.059 .463</td>
</tr>
<tr>
<td>education level to depression W2</td>
<td>.014 .857</td>
<td>-.053 .459</td>
</tr>
<tr>
<td>FI W1 to FI W2</td>
<td>.599 ***</td>
<td>.465 ***</td>
</tr>
<tr>
<td>FI W1 to depression W2</td>
<td>.142 .106</td>
<td>.221 .005**</td>
</tr>
<tr>
<td>Depression W1 to FI W2</td>
<td>.006 .948</td>
<td>.191 .024*</td>
</tr>
<tr>
<td>Depression W1 to Depression W2</td>
<td>.561 ***</td>
<td>.546 ***</td>
</tr>
<tr>
<td>FI W1 to parent support</td>
<td>-.010 .993</td>
<td>-.104 .339</td>
</tr>
<tr>
<td>FI W1 to parenting efficacy</td>
<td>.200 .063</td>
<td>-.054 .591</td>
</tr>
<tr>
<td>Depression W1 to parent support</td>
<td>-.301 .011*</td>
<td>.000 .999</td>
</tr>
<tr>
<td>Depression W1 to parenting efficacy</td>
<td>.067 .541</td>
<td>-.127 .220</td>
</tr>
<tr>
<td>FI W2 to parent support</td>
<td>-.008 .940</td>
<td>-.001 .990</td>
</tr>
<tr>
<td>FI W2 to parenting efficacy</td>
<td>-.111 .262</td>
<td>-.030 .760</td>
</tr>
<tr>
<td>Depression W2 to parent support</td>
<td>-.179 .122</td>
<td>-.375 ***</td>
</tr>
<tr>
<td>Depression W2 to parenting efficacy</td>
<td>-.407 ***</td>
<td>-.166 .135</td>
</tr>
<tr>
<td>Parent support to parenting efficacy</td>
<td>.403 ***</td>
<td>.349 ***</td>
</tr>
</tbody>
</table>

* * p < 0.001.

Note. FI = Food insecurity.

In the group with low levels of knowledge of community resources, the following paths were significant: food insecurity Wave 1 to food insecurity Wave 2 (β = .599, p <
depression Wave 1 to depression Wave 2, \((\beta = .561, p < .001)\), depression Wave 1 to perceived parenting support \((\beta = -.301, p < .05)\), perceived parenting support to parenting self-efficacy \((\beta = .403, p < .001)\), and depression Wave 2 to parenting self-efficacy \((\beta = -.407, p < .001)\). Forty percent of the variance in depression Wave 2 \((R^2 = .399)\) is explained by the model. Thirty-eight percent of the variance in food insecurity Wave 2 \((R^2 = .376)\) is explained by the model. For the parenting variables, perceived parenting support and parenting self-efficacy, twenty percent \((R^2 = .196)\) and thirty-seven percent \((R^2 = .369)\) of the variance was explained by the model.

In the group with high levels of knowledge of community resources, the following paths were significant: food insecurity Wave 1 to food insecurity Wave 2 \((\beta = .465, p < .001)\), food insecurity wave 1 to depression wave 2 \((\beta = .221, p < .01)\), depression wave 1 to food insecurity wave 2 \((\beta = .191, p < .05)\), depression wave 1 to depression wave 2 \((\beta = .599, p < .001)\), depression wave 2 to perceived parenting support \((\beta = .546, p < .001)\), and perceived parenting support to parenting self-efficacy \((\beta = .349, p < .001)\). Forty-three percent of the variance in depression Wave 2 \((R^2 = .433)\) is explained by the model, while thirty-three percent \((R^2 = .325)\) of food insecurity at Wave 2 is explained. For the parenting variables of perceived parenting support and parenting self-efficacy, eighteen percent \((R^2 = .183)\) and thirty percent \((R^2 = .299)\) of variance is explained respectively.

Discussion
The purpose of this study was to examine the relations between food insecurity, depression, and parenting, and how knowledge of community resources could influence
the relations. Food insecurity was found to predict depression and depression was found to predict both parenting self-efficacy and perceived support in the parenting role. Knowledge of community resources did moderate the relation between depression and perceived parenting support, and between food insecurity and parenting self-efficacy, which is evidence that knowledge of community resources served as a protective mechanism, since those with high levels of knowledge of community services did not have a statistically significant relationship between the depression score and the perceived parenting support score or the food insecurity score and the parenting self-efficacy score. For the group with low levels of knowledge of community resources, the relationship between depression and perceived parenting support was significant, and the relationship between food insecurity and parenting self-efficacy approaches significance.

Numerous family policy implications can be drawn from the findings. Depression significantly predicted perceived parental support and parental confidence in both the high and low knowledge of community resources groups. Given that mothers with low incomes are at a higher risk for depression and may have difficulty in accessing mental health services, the population in this study is at high risk for depression. Policy makers should consider ways to increase both access to and knowledge of community mental health centers for rural families.

Limitations

In this study, the sample was purposively selected, which limits generalizability. Another limitation is that the measures only reflect the perceptions of the mother,
leaving out the perspectives of other household members or observational data. Each construct was measured by only one scale, reducing convergent validity.

**Conclusion**

There is a dearth of research regarding the well-being of rural families. It is clear that food insecurity and depression are detrimental to parenting self-efficacy and perceived parenting support. Further research should continue to examine the role of knowledge of community resources in a model similar to the one in the present study.

Additionally, since the economic status of the United States has changed drastically since the early 2000s, an examination of how the Great Recession of 2007 affected the social support system for low-income rural families is crucial to further the knowledge base about how low-income rural families adapt to stressors. Changes in the ability for friends and family to be generous with their resources, both tangible and intangible should be examined. An exploration of how to increase access to formal support and reduce the stigma surrounding the utilization of formal social supports, especially Supplemental Nutrition Assistance Program (SNAP) and mental health services is also essential. It remains to be seen if the Affordable Care Act will have the desired impact of increasing access to healthcare for rural families.

Finally, in order to create policies that support mothers with low-income living in rural areas to raise their children to the best of their ability, more research is needed to determine predictors of parenting efficacy and perceived support in the parenting role, as well as potential moderators. With this information, policy makers can create
policies that address risks and protective mechanisms that take into account the experiences of mothers with low-income living in rural areas.

References


Mayo Clinic http://www.mayoclinic.com/health/depression/DS00175 retrieved 3/22/11


http://www.who.int/mental_health/management/depression/definition/en/
CHAPTER 3: THE RELATIONS BETWEEN DEPRESSIVE SYMPTOMOLOGY, PARENTING SELF-EFFICACY, FAMILY FUNCTIONING AND FINANCIAL PRESSURE AMONG RURAL MOTHERS WITH LOW-INCOMES

Kimberly D. Doudna, Kimberly A. Greder

Abstract
Risk and resilience theory were used to examine the relations between depressive symptomology, parenting self-efficacy, family functioning and financial pressure. Data from the Rural Families Speak dataset were analyzed using path analysis for 240 low-income rural mothers. Results show that depressive symptomology is negatively associated with parenting self-efficacy and family functioning. Parenting self-efficacy is positively associated with family functioning. Financial pressure was found to moderate the path between depressive symptomology and parenting self-efficacy. Policy implications regarding depression, parenting, family functioning and financial pressure are discussed.

Introduction
Rural mothers face greater disparities in access to health care compared to urban mother, thus placing them at greater risk for maternal depression and poor family functioning (Merwin, Snyder & Katz, 2006). This is important because while these mothers are at risk for poor mental health status, they are by virtue of where they live, less likely to receive mental health services, and less likely to afford mental health services (Merwin, Snyder & Katz, 2006).

In this study, researchers hypothesize that depressive symptomology is negatively associated with parenting self-efficacy, and parenting self-efficacy is positively associated with family functioning. Additionally, the researchers hypothesize that financial pressure will moderate the relation between depressive symptomology and parenting self-efficacy. The conceptual model is shown in Figure 1.
A family’s ability to experience risks, but still have positive outcomes is the main tenet of family resilience (Patterson, 2002). There are three contexts (i.e., individual, family, extra familial) outlined by Masten and Coatsworth (1998) that should be considered in evaluating resilience at the level of the individual. Patterson (2002) applied the contexts of Masten and Coatsworth (1998) to the family level.

Key elements of risk-resilience theory are protective mechanisms, which serve to buffer the effects of risks experienced by the family or individual (Patterson, 2002). Protective mechanisms operate on three ecological levels; the individual, the family and the community (Patterson, 2002).
In the current study, depressive symptomology is viewed as a risk, as it negatively impacts parenting self-efficacy and family functioning. The protective mechanism in the model is financial pressure, which is hypothesized to act as a moderating variable, with low levels of financial pressure reducing the negative relation between depressive symptomology and parenting self-efficacy and high levels of financial pressure increasing the negative relation between depressive symptomology and parenting self-efficacy.

*Maternal Depression*

Depression is a mental health condition characterized by symptoms of sadness, loss of interest in previously enjoyable activities, guilt, altered sleep patterns and difficulty concentrating (Center for Disease Control and Prevention, 2011; World Health Organization, 2010). Around the world, depression is known to be one of the foremost causes of disease burden for women and girls (Lazear, Pires, Isaccs, Chaulk, & Huang, 2008). For women worldwide, depression is the fourth most frequent health disorder (World Health Organization, 2010). While depression is a disease that does not discriminate between racial and ethnic groups, depression is twice as likely to occur among women who have low incomes, than among women who have high incomes (Cutrona, Wallace, & Wesner, 2006; Lennon, Blome, & English, 2001). Of rural households headed by women, over one third are poor (Lichter & Jensen, 2002), placing them at an increased risk for depression. Often, women experience maternal depression when their children are in early childhood (Hammen, 2003b; Jones & Ford, 2008; Odom & Vernon-Feagans, 2010). Taken together, the factors of rurality, income and motherhood place the women in the current study at risk for experiencing maternal depression.
The consequences of maternal depression extend beyond the individual mother. Researchers continue to address the risks of depression among women with low-income who live in rural areas, however few studies have looked at the longitudinal effects of maternal depression on parenting self-efficacy and family functioning. Depression can limit a mother’s ability to successfully parent her child (Gotlib & Goodman, 1999), and can result in less empathy and emotional responsiveness to her child when compare with mothers who are not depressed (Silberg & Rutter, 2002). In contrast to these results, Turney (2010) found a weak, negative association between maternal depression and engagement. However, the results did not show a causal relationship between maternal depression and parenting behaviors. In light of these results, further research on this area is merited.

**Parenting Self-efficacy**

Bandura (1997) defines self-efficacy as “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (p. 3). Parenting self-efficacy refers to a parent’s belief about their ability to guide their child using an approach that encourages the child’s development and success (Ardelt & Eccles, 2001). Parenting self-efficacy was linked indirectly to parenting practices in African American mothers living in rural areas (Brody, Flor & Gibson, 1999). Developmental goal setting mediated the relationship between parenting self-efficacy and parenting practices. In their review of potential roles of parenting self-efficacy, Jones and Prinz (2005) conclude that the role of parenting self-efficacy differs depending on parents, children, and background variables, and call for more longitudinal research about parenting self-efficacy.
Family Functioning

Bandura, Caprara, Barbaranelli, Regalia and Scabini (2011) incorporate parenting self-efficacy into a study designed to understand the effect of family efficacy (family members’ beliefs about the family’s ability to cooperate in order to achieve development, well-being, extrafamilial ties and resilience) on family functioning and family satisfaction. Bandura et al. (2011) found that family efficacy is positively related to family functioning and family satisfaction. Family functioning as a construct can be defined in numerous ways. Some researchers use marital relationship measures (Cummings, Keller, & Davies, 2005) as a proxy for family functioning, while others use a combination of both marital relationship and parent-child relationship (Herr, Hammen, & Brennan, 2007). In the current study, family functioning is conceptualized through the five aspects of adaptability, partnership, growth, affection, and resolve as outlined by Smilkstein (1978). Smilkstein (1978) defines adaptability as the use of resources when a family is stressed during a crisis, partnership as family members who share in decision making and nurturing responsibilities, growth as physical and emotional maturation that is achieved through support and guidance from family members, affection as caring or loving relationships among family members and resolve as the commitment to devote time to other family members for physical and emotional nurturing, as well as the decision to share wealth and space.

Financial pressure

Financial pressure is viewed as a form of financial distress (Gudmunson, Son, Lee, & Bauer, 2010). Financial pressure in the present study refers to the mother’s evaluation of the family’s economic situation in terms of the family’s ability to pay for necessities, such as food and clothing. Research shows a positive relationship between emotional distress,
including depression, and financial distress (Conger, Reuter, & Conger, 2000; Conger & Conger, 2002; Dennis, Parke, Coltrane, Blacher, & Borthwick-Duffy, 2003; Gudmunson, Beutler, Israelsen, McCoy, & Hill, 2007). Although the entire sample is considered to have low-income, financial pressure is used as a moderator in the current study.

Methods

Participants

The sample was aggregated from the multi-state longitudinal study of rural low income families, *Rural Families Speak* (Bauer, 2004; Bauer & Katras, 2007). Panel data from waves 1, 2 and 3 of *Rural Families Speak* was used for this study (N = 240). Although the unit of analysis in this study is the family, mothers were the respondents. Participation criteria for the mothers included: (a) aged 18 or older, (b) had a child 12 years of age or younger, and (c) household income at or below 200% of federal poverty level. Additionally, mothers who lived in counties considered rural according to Butler and Beale (1994) were recruited into the study. The large majority of the mothers were Non-Hispanic-white (66.3%), while close to a quarter of the mothers identified themselves as Hispanic/Latino (20.4%), and fewer self-identified as African American (6.3%) Native American (0.8%) multi-racial (4.6%), and other (0.4%). Three (1.3%) participants had missing data for race. Marital status for the mothers included married (42.5%), living with a partner (17.1%), single (22.1%), divorced (12.9%), and separated (5.4%). Mothers educational level included 8th grade or less (7.1%), some high school (15%), high school or GED (30.8%), specialized technical, business or vocational training (15%), some college (27.9%), college or university graduate (3.3%), and graduate degree (0.8%).
Table 1. *Waves, Panels and States in Rural Families Speak.*

<table>
<thead>
<tr>
<th>Wave 1 Panel 1</th>
<th>Wave 1 Panel 2</th>
<th>Wave 1 Panel 3</th>
<th>Wave 2 Panel 1</th>
<th>Wave 2 Panel 2</th>
<th>Wave 2 Panel 3</th>
<th>Wave 3 Panel 1</th>
<th>Wave 3 Panel 2</th>
<th>Wave 3 Panel 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA, IN, KY, LA, MA, MD, MI, MN, NE, NH, NY, OH, OR, WY</td>
<td>WV IA, SD</td>
<td>CA, IN, KY, LA, MA, MD, MI, MN, NE, NH, NY, OH, OR, WY</td>
<td>WV IA</td>
<td>CA, IN, KY, LA, MA, MD, MI, MN, NE, NH, NY, OH, OR, WY</td>
<td>WV IA</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Data Collection*

In-person interviews using a semi-structured protocol were conducted annually with mothers in locations convenient to them, such as their home and were audio recorded, and transcribed verbatim. The interviews lasted approximately 90-120 minutes and yielded both quantitative and qualitative data about participants’ household composition, physical and mental health, food security status, housing, household expenses, income, attitudes about and experiences with welfare reform, social support, and parenting.

*Measures*

Symptomology of depression was measured using the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977). The CES-D measure contains 20 items. Response options were based on a Likert-type scale from 0 (*rarely or none of the time*) to 3 (*most or all of the time*) ($\alpha = .90$, n = 468). Participants were asked to reflect on their life
over the past two weeks and respond to questions using the Likert-type scale, such as: ‘I felt lonely’, ‘I could not shake the blues’, ‘I could not get going’ and ‘People were unfriendly’.

Mother’s education level was measured on a scale from 1 (8th grade or less) to 8 (graduate degree). Total number of children was the number of children reported to be living in the household at Wave 1.

Seven questions were used to create a sum score to measure parenting self-efficacy. Questions from the Oregon Healthy Start Parent Ladder (Pratt et al., 2000) were adapted for use in the Rural Families Speak project. Participants responded to questions about parenting self-efficacy on a Likert type scale that ranged from 0 (no agreement) to 6 (high level of agreement). Cronbach’s alpha was .66 (n = 301) for the parenting self-efficacy sub-scale. Examples of the seven items about parenting self-efficacy include ‘Confidence that you know what is right for your child’, ‘Ability to create a safe home for your child’, ‘Ability to find fun activities of interest to your child’, and ‘Knowledge of children’s growth and development’.

Family functioning was measured using five questions from the Family APGAR (Smilkstein, 1978). Participants responded to questions about their satisfaction with how their family functions on a Likert type scale that ranged from 0 (never) to 4 (always) and included questions such as ‘I am satisfied with the amount of time my family and I spend together’, ‘I am satisfied with the help I receive from my family when something is troubling me’ and ‘I am satisfied with the way my family expresses affection and responds to my feelings such as anger, sorrow and love’. For the current study, Cronbach’s alpha = .89 (n = 327).
Analysis

The conceptual model was first tested in Analysis of Moment Structures (AMOS), but the fit indices indicated that the model did not fit the data. Due to the correlation between education level and family functioning, an additional path was added to the model from education to family functioning. To examine the relations between the variables, Model 1 was tested using path analysis in AMOS. Paths from each exogenous (depressive symptomology Wave 1, total number of children Wave 1 and education level Wave 1) variable to the endogenous variable of parenting self-efficacy were included. Additionally, a path from depressive symptomologoy Wave 1 to family functioning Wave 3 was included. A path from parenting self-efficacy Wave 2 to family functioning Wave 3 was included. Model 1 was then tested using two groups: (a) participants with low levels of financial pressure (n=119) and (b) participants with high levels of financial pressure (n=92). The median sum score of financial pressure was used to create the two groups. Participants with scores of 3 and above comprised the high group, while participants with a score of 2 and below comprised the low group. Using the populations of high and low levels of financial pressure, bivariate correlations were run for all variables in the model.

To determine if financial pressure was a moderating variable, critical ratios for differences were computed in AMOS and then from the pairwise comparison matrix generated in AMOS, critical z-scores from the pairwise comparisons were created and analyzed.

Results

Table 1 presents descriptive statistics for depressive symptomology, parenting self-efficacy, financial pressure and family functioning. Bivariate correlations for all variables in
the model can be found in Table 2. Numerous statistically significant correlations were found.

Table 1. Means and Standard Deviations for Measures.

<table>
<thead>
<tr>
<th></th>
<th>High financial pressure</th>
<th>Low financial pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>CES-D (Depressive Symptomology)</td>
<td>19.21</td>
<td>10.67</td>
</tr>
<tr>
<td>Parenting Ladder (Parenting Self-efficacy)</td>
<td>31.07</td>
<td>4.90</td>
</tr>
<tr>
<td>Family APGAR (Family Functioning)</td>
<td>14.88</td>
<td>4.82</td>
</tr>
<tr>
<td>Financial Pressure</td>
<td>4.26</td>
<td>1.18</td>
</tr>
</tbody>
</table>

Table 2. Correlations Among Variables for Groups High in Financial Pressure (above) and Low in Financial Pressure (below).

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number of Children</td>
<td>1</td>
<td>-0.21*</td>
<td>0.00</td>
<td>-0.02</td>
<td>0.24*</td>
<td>-0.09</td>
</tr>
<tr>
<td>2. Participant’s educational level</td>
<td>-0.12</td>
<td>1</td>
<td>-0.04</td>
<td>0.07</td>
<td>-0.03</td>
<td>-0.19</td>
</tr>
<tr>
<td>3. CES-D</td>
<td>-0.22*</td>
<td>0.01</td>
<td>1</td>
<td>-0.41**</td>
<td>0.24*</td>
<td>-0.25*</td>
</tr>
<tr>
<td>4. Parenting Self-efficacy</td>
<td>-0.01</td>
<td>0.13</td>
<td>-0.14</td>
<td>1</td>
<td>-0.12</td>
<td>0.32**</td>
</tr>
<tr>
<td>5. Financial Pressure</td>
<td>0.04</td>
<td>-0.12</td>
<td>0.26**</td>
<td>-0.09</td>
<td>1</td>
<td>-0.15</td>
</tr>
<tr>
<td>6. Family Functioning</td>
<td>0.05</td>
<td>-0.30**</td>
<td>-0.31**</td>
<td>0.25**</td>
<td>-0.19*</td>
<td>1</td>
</tr>
</tbody>
</table>

* $p < 0.05$ (2-tailed), ** $p < 0.01$ (2-tailed)
The results of the model for the entire sample (n = 240) are shown in Table 3. The $\chi^2$ for the full sample model was .86 with $df = 1$ ($p = .354$). The model fit the data very well, CFI = 1.00, RMSEA = 0.00. The following paths were significant, depression to parenting self-efficacy and family functioning, education level to family functioning and parenting self-efficacy to family functioning, supporting the hypothesis that depression and parenting self-efficacy have a negative relation and parenting self-efficacy and family functioning have a positive relation. Depression in Wave 1 is negatively related to parenting self-efficacy in Wave 2, $\beta = -.25, p < .001$, and family functioning in Wave 3, $\beta = -.19, p = .003$. Parenting self-efficacy in Wave 2 was positively related to family functioning in Wave 3, $\beta = .24, p < .001$. The covariates of total number of children and mothers’ education level were not found to predict parenting self-efficacy. However, a path from education level to family functioning was added to the model to increase the fit, and this path was significant, $\beta = -.24, p < .001$.

Seven percent of the variance in parenting self-efficacy in Wave 2 is explained by depression in Wave 1 ($R^2 = .067$). Seventeen percent of the variance in family functioning is explained by depression and education level in Wave 1 and parenting self-efficacy in Wave 2 ($R^2 = .166$).

When the model was tested with the group with low financial pressure, the $\chi^2$ for was 2.27 with $df = 2$ ($p = .322$). The paths from parenting self-efficacy, education level and depression to family functioning remained significant. Parenting self-efficacy was positively related to family functioning, $\beta = .25, p = .002$. Depression was negatively related to family
Table 3. Path Analysis Results for the Final Model.

<table>
<thead>
<tr>
<th>Paths</th>
<th>Estimate (B)</th>
<th>SE</th>
<th>P</th>
<th>Standardized Estimate (β)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression to parenting self-efficacy</td>
<td>-0.113</td>
<td>.029</td>
<td>***</td>
<td>-.251</td>
</tr>
<tr>
<td>Total number of children to parenting self-efficacy</td>
<td>-0.177</td>
<td>.252</td>
<td>.483</td>
<td>-.044</td>
</tr>
<tr>
<td>Education level to parenting self-efficacy</td>
<td>0.211</td>
<td>.229</td>
<td>.357</td>
<td>.058</td>
</tr>
<tr>
<td>Parenting self-efficacy to family functioning</td>
<td>0.213</td>
<td>.054</td>
<td>***</td>
<td>.242</td>
</tr>
<tr>
<td>Depression to family functioning</td>
<td>-0.074</td>
<td>.025</td>
<td>.003</td>
<td>-.187</td>
</tr>
<tr>
<td>Education to family functioning</td>
<td>-0.781</td>
<td>.191</td>
<td>***</td>
<td>-.244</td>
</tr>
</tbody>
</table>

*** p < .001

functioning, $\beta = -.27$, $p = .001$. Education was negatively related to family functioning, $\beta = -.34$, $p < .001$.

When the model was tested for the group with low financial pressure, four percent of the variance in parenting self-efficacy in Wave 2 was explained by depression in Wave 1 ($R^2 = .036$). Twenty-five percent of the variance in family functioning was explained by depression and education level in Wave 1 and parenting self-efficacy in Wave 2 ($R^2 = .247$).

When the model was tested for the group with high levels of financial pressure, $\chi^2$ for was 2.27 with $df = 2$ ($p = .322$). The path from depression to parenting self-efficacy, which was not significant for the group with low levels of financial pressure, was significant for the group with high levels of financial pressure, $\beta = -.40$, $p < .001$. The positive relation between
parenting self-efficacy and family functioning remained significant, $\beta = .28, p = .008$. The path from education level to family functioning was significant, $\beta = -.214, p = .026$.

For the group with high levels of financial pressure, depression and education level at Wave 1 explained 17% the variance in parenting self-efficacy at Wave 2 ($R^2 = .168$). Seventeen percent of the variance in family functioning in Wave 3 was explained by depression and educational level at Wave 1 and parenting self-efficacy at Wave 2 ($R^2 = .165$). The results for the full sample, low and high groups for the final model can be found in Figure 2.

**Figure 2. Results for the Final Model, Moderated by Level of Financial Pressure.**

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

*Note: Results are shown as follows: Low financial pressure (high financial pressure).*

**Discussion**

Depression significantly predicted parental confidence in the full model and for the group with a high level of financial pressure. A potential family policy recommendation is to fund research-based home visiting programs specifically designed to reach low income
rural families, especially those experiencing financial pressure, in order to improve mental health and family outcomes, such as increased family functioning. To reach families that have school-age children, research-based mental health services located in the school system could provide families with greater access.

Parenting self-efficacy was positively related to family functioning. A potential family policy option related to this relation is that programs that target a parent’s confidence in his or her parenting ability will not only benefit the parent, but the family as a whole.

One relationship in the model was surprising. The researchers added a path from education level to family functioning to improve model fit. This relation implies that as education level increases, family functioning decreases. It is likely that there is a confounding variable related to education level and family functioning that accounts for this puzzling relation.

Limitations

Although the results of the study are substantive, there are limitations. First, generalizability to other populations is limited because the sampling method was purposive. Although the measure used to quantify depressive symptomology is standardized, it, along with the measures for parenting self-confidence and family functioning is self-reported data, which is subject to social desirability bias. In addition, from the family functioning measure, only the mother’s perspective is revealed, which may differ from that of other family members. Finally, each variable was measured with only one measure, which limits convergent validity.

All of the participants in this study were living at or below 200% of the federal poverty level in the early 2000s. An examination of how the Great Recession of 2007 and
subsequent economic downturn is related to financial pressure experienced by rural families is crucial to further the knowledge base about how rural families adapt to stressors.

Future research projects should also consider taking into account the perspectives of fathers and children in the household. This data would provide a more accurate approximation of the experiences of families who have low incomes and live in rural areas.

References


Rural dimensions of welfare reform (pp. 77-110) Kalamazoo, Michigan: W.E. Upjohn Institute for Employment Research.


http://www.who.int/mental_health/management/depression/definition/en/
CHAPTER 4: GENERAL CONCLUSIONS

General Discussion

The purpose of this thesis was to gain an understanding of the longitudinal relations between depressive symptomology, parenting self-efficacy and other specific individual and family level variables in rural mothers who had low household incomes. This thesis used data from a secondary data set, and used quantitative methodology to answer the research questions. The data showed that depressive symptomology has a long term impact on parenting self-efficacy, perceived support in the parenting role, and family functioning.

The first research question sought to determine the relations between depressive symptomology, food insecurity, parenting self-efficacy, and perceived support in the parenting role. Through the use of path analysis, it was determined that food insecurity and depression predict each other over time and that depression is negatively related to perceived parenting support and parenting self-efficacy. Food insecurity was not found to be associated with parenting self-efficacy and perceived parenting support.

The second question posited that a mother’s knowledge of community resources could moderate the relations between maternal depression, food insecurity, parenting self-efficacy, and perceived parenting support. A mother’s knowledge of community resources did moderate the path between depression at Wave 1 and perceived parenting support in Wave 2, and food insecurity at Wave 1 to parenting self-efficacy in Wave 2.

The third question sought to determine the relations between maternal depression, parenting self-efficacy and family functioning. Through the use of path analysis, it was found that depression was negatively related to parenting self-efficacy and family functioning. Parenting self-efficacy was positively related to family functioning. Education was
negatively related to family functioning. This was an unexpected result, and the relation could likely be explained by an unmeasured confounding variable.

Finally, the fourth question posited if financial pressure would moderate the relations between maternal depression and parenting self-efficacy. Financial pressure did moderate that relation, with the path between maternal depression and parenting self-efficacy becoming non-significant when the model was run with participants who had a score of 2 or less for the financial pressure measure. For those with a score of three or more, this relation was highly significant.

*Risk and Resilience Theory*

Risk and resilience theory was used to guide the construction of the conceptual models used in both studies. A mother’s knowledge of community resources and a mother’s perception of financial pressure were hypothesized to be protective mechanisms that would moderate relations in the models. Knowledge of community resources was conceptualized as being a protective mechanism located between the family and community levels. This variable, although found statistically to be a moderator, the effect of the moderation did not support it as protective mechanism. A low level of perceived financial pressure was conceptualized as being a protective mechanism on the family level. A low level of financial pressure did serve as a protective mechanism, in that the path from maternal depression to parenting self-efficacy was not significant. Depressive symptomology does not seem to have the same effect on the parenting self-efficacy of mothers whose families are able to pay for the things they need, such as food, clothing and medical care.
Limitations of the Present Study

Given that the mothers in this sample were selected based on key characteristics they possessed, instead of being randomly selected, the results of the studies are not generalizable to all rural mothers who have low incomes and young children. The data all come from self-report, and although the measures are reliable, the responses could still be biased due to social desirability. In addition, each variable was measured using only one scale, which reduces convergent validity. The results are based on data collected from the mothers, omitting the perspectives of other family members or observational data. Finally, the context of place is not taken into account. Although all of the communities were rural, there could be substantial differences in the community, such as local policies, levels of stigma associated with having low income, and availability of programs related to food assistance, mental health, and parenting.

Recommendations for Future Research
Since data collection for the current study ended before the Great Recession of 2008, new longitudinal research projects designed to explore the effect the economic downshift had on families in rural areas are necessary. It is possible that the current experiences of rural families are different in substantive ways. A risk-resilience framework would help researchers hone in on specific variables of interest and explore their roles as risks, protective mechanisms and individual or family outcomes. Much could be learned if researchers were able to interview the same mothers from Rural Families Speak and measure the same variables to discern how they are faring now compared to earlier. Through interviewing others in the household, such as children and fathers, researchers could also gain a new perspective on the functioning of rural families with low incomes. Finally, it would be of
interest to follow the children as they move into adulthood in order to track their well-being longitudinally, and to determine how their past may influence their current situations.
APPENDIX

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
315-394-6500
FAX 315-394-4267

Date: 2/24/2011
To: Dr. Kimberly Greder
1086 LeBaron Hall

From: Office for Responsible Research

Title: Latino Immigrants: Tracking the Effects of Changing Public Policies on Family Well-Being

IRB Num: 04-039

Approval Date: 2/24/2011
Continuing Review Date: 1/29/2012

Submission Type: Modification
Review Type: Expedited

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University. Please refer to the IRB ID number shown above in all correspondence regarding this study.

Your study has been approved according to the dates shown above. To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- Use only the approved study materials in your research, including the recruitment materials and informed consent documents that have the IRB approval stamp.

- Obtain IRB approval prior to implementing any changes to the study by submitting the "Continuing Review and/or Modification" form.

- Immediately inform the IRB of (1) all serious and/or unexpected adverse experiences involving risks to subjects or others; and (2) any other unanticipated problems involving risks to subjects or others.

- Stop all research activity if IRB approval lapses, unless continuation is necessary to prevent harm to research participants. Research activity can resume once IRB approval is reestablished.

- Complete a new continuing review form at least three to four weeks prior to the date for continuing review as noted above to provide sufficient time for the IRB to review and approve continuation of the study. We will send a courtesy reminder as this date approaches.

Research investigators are expected to comply with the principles of the Belmont Report, and state and federal regulations regarding the involvement of humans in research. These documents are located on the Office for Responsible Research website http://www.compliance.iastate.edu/irb/forms/ or available by calling (315) 294-4566.

Upon completion of the project, please submit a Project Closure Form to the Office for Responsible Research, 1138 Pearson Hall, to officially close the project.
**PROTOCOL AMENDMENT FOR PERSONNEL CHANGES ONLY**

Institutional Review Board

**1. ADMINISTRA TIVE**

<table>
<thead>
<tr>
<th>General Instructions: Email the completed form to <a href="mailto:IRB@iastate.edu">IRB@iastate.edu</a> or mail it to IRB Administrator in 103 Pearson Hall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol Number: 05-039</td>
</tr>
<tr>
<td>Protocol Title: Latino Immigrants: Tracking the Effects of Changing Public Policies on Family Well-Being</td>
</tr>
</tbody>
</table>

| Principal Investigator: Kimberly Greder |
| Phone: 515-294-5906 |
| Fax: 515-294-5507 |
| E-mail: kgreder@iastate.edu |

**2. CHANGES IN NAMED PERSONNEL**

(Refers to anyone who obtains information about living individuals by intervening or interacting with them for research purposes; obtains identifiable private information about living individuals for research purposes; obtains the voluntarily informed consent of individuals to be subjects in research, and studying, interpreting, or analyzing identifiable private information or data for research purposes. Changes in the principal investigator for a research study must be submitted on a new application.)

<table>
<thead>
<tr>
<th>Person's Deleted:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Person's Added</td>
<td>Human Subject Training Date</td>
<td>Describe the individual's duties on the project and their expertise/qualifications and training related to those duties.</td>
</tr>
<tr>
<td>Kimberly Douda</td>
<td>8/19/10</td>
<td>Analyze data; prepare narrative based on data analysis</td>
</tr>
<tr>
<td>Clinton Gudmunson</td>
<td>11/10/10</td>
<td>Assist in overseeing identification of variables to analyze</td>
</tr>
</tbody>
</table>

If you don't know your training date, contact the Office for Responsible Research for assistance.

**OFFICE USE ONLY**

**APPROVAL SIGNATURE**

/ All training requirements have been met.

[Signature]

[Date: 2/24/11]

Office for Responsible Research: IRB 913/10