

Maternal mental health and child health and nutrition

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## 2-Maternal Mental Health

### Abstract

In this chapter, the family stress model provides a framework for exploring the relationships between maternal mental health and child health and nutrition, in the context of poverty. Specifically, we examine what is known about the links between maternal depression and anxiety with the increased rates of overweight, nutritional deficiencies, food insecurity, and overall poorer health observed among low-income children. We then explore how maternal psychological distress may impact three parenting practices linked to these child health domains: 1) health-related parenting behaviors, such as monitoring the child's access to television; 2) parental feeding strategies, such as how long the mother breastfeeds; and 3) food-related coping strategies, such as the need to shop in a variety of stores for the best food bargains. We conclude with three key directions to advance our understanding of the pathway from maternal mental health to child outcomes.

**KEYWORDS** – Maternal depression, maternal anxiety, child obesity, food insecurity, parenting behaviors, coping strategies, poverty

### 3-Maternal Mental Health

#### Introduction

In 2009, an estimated 14.3% of all U.S. people were living below the federal poverty level and almost one in 5 American children (15.3 million) was living in poverty (U.S. Census Bureau, 2009). Given that the poverty level (\$18,310 for a family of 3 in 2009) grossly underestimates the amount of money a family requires to meet their basic needs (Cauthen & Fass, 2008), the estimate of children living in households with inadequate access to numerous resources necessary for positive child outcomes, including good nutrition is much higher. Indeed, approximately 31.3 million children live in low income households that struggle to make ends meet (Chau, Thampi, & Wight, 2010). Research has established a link between poverty and negative child developmental outcomes that holds true for both individual level indicators of poverty (e.g., income, financial stress, occupational and employment status) as well as for composite indicators, including socio-economic status or indices of multiple risk. Further, these associations hold true for a wide range of outcomes (e.g., socio-emotional, cognitive/academic, and health and behavior) across a wide range of ages (e.g., infancy through adolescence).

In searching for the mechanisms that explain these links, many have argued that what is most important about the effects of poverty is the child's increased exposure to multiple risk factors (Evans, 2004) which seem to affect low-income households and families at much greater rates than non-poor households. A variety and multiple physical and psychosocial risks define the environment of poverty, ranging from increased exposure to a wide range of toxins and teratogens such as lead, air pollution, and smoke (Evans & Pilyoung, 2010), to a higher likelihood of living in substandard housing in resource-poor neighborhoods (Evans & English, 2002). While these and other correlates of poverty clearly influence child developmental

#### 4-Maternal Mental Health

trajectories, maternal mental health has emerged as a prevalent product of poverty, and has been implicated in the pathway from poverty to many adverse child outcomes.

Conger and colleagues were among the first to specify this pathway from poverty, to maternal mental health, to child development (Conger, 2005; Conger & Elder, 1994; Conger, Wallace, Sun, Simons, McLoyd, & Brody, 2002). Known as family stress or economic stress theory, Conger proposed that the condition of poverty creates economic stress and strain as the parent struggles to meet the basic needs of the family. This persistent economic stress leads to psychological distress for the parent, including depression and anxiety. Psychological distress, in turn, undermines effective parenting which then negatively impacts child development. It should be noted that the connection between economic distress, parenting capacity and behaviors, and detrimental consequences for children can be found in other theories such as McLoyd's and Wilson's (1990) integrated model of child development, and Belsky's (1994) parenting process model, and is consistent with Bronfenbrenner's (1979) ecological framework.

Research has supported the link from maternal mental health to impaired parenting (Lee, Anderson, Horowitz, & August, 2009; White, Roosa, Weaver, & Nair, 2009), and to poor child behavioral and cognitive outcomes among low-income families (Jackson, Brooks-Gunn, Huang, & Glassman, 2000; Peterson & Albers, 2001). In this chapter, we focus on identifying what is known about the connection between maternal mental health and diminished child health outcomes among poor families, with a focus on low-income children's nutritional status, including growth and iron-deficiency anemia, and rates of obesity, overall physical health and food security status. We begin by discussing the prevalence of poor child health and nutritional outcomes among low-income U.S. families. Next, we present data concerning mental health disorders among poor mothers. We then turn our focus to determining how maternal mental

## 5-Maternal Mental Health

health may affect parenting behaviors around health and nutrition that ultimately lead to less healthy outcomes for children.

### Poverty and Child Health and Nutritional Risk

Even among well-nourished populations (e.g., U.S.), where malnutrition is not endemic, children growing up in poverty are at increased nutritional risk. Research has consistently shown that children in low income families are more likely to be exposed to nutrition-related health challenges such as poor growth (Polhamus, Thompson, Dalenius, Borland, Smith, Mackintosh, & Grummer-Strawn, 2009), food insecurity (Nord, Andrews, & Carlson, 2009), anemia (Cusick, Mei, & Cogswell, 2007), inadequate nutrition in-utero (Bodnar & Siega-Riz, 2002), and later obesity (Polhamus et al., 2009).

*Growth.* Both short stature and underweight, defined as less than the fifth percentile based on sex-specific height or weight for age respectively (using the CDC growth reference data), are more prevalent among low income young children less than five years of age than the general population. Based on the 2008 data, 5.9% of low income children receiving publicly funded health or nutrition programs had short stature compared to 3.7% of all U.S. children. Because the prevalence of short stature among low income children was higher than the expected value of 5%, experts deem this finding as indicative of the effects of poverty. In contrast, the prevalence of underweight in this group was slightly higher than in the general population, 4.5% versus 3.4%, but did not exceed the expected range (Polhamus et al., 2009). Short stature can be a consequence of chronic poor nutrition, recurrent illness or both, and is one of the few long term indicators of poor nutrition. It can stem from in-utero effects resulting in low birthweight or postnatal growth retardation from poor nutrition or recurrent illness (Polhamus et al.).

## 6-Maternal Mental Health

*Iron Deficiency Anemia.* Iron deficiency anemia (IDA) is a common nutritional problem that occurs most frequently in infants and children between the ages of 9-18 months. Despite significant declines in the prevalence of IDA in children over the past 30 years attributable to public health efforts to promote iron supplementation during pregnancy, iron fortified formula for infants, and iron fortified cereal to all vulnerable groups, it is still fairly common among low income children. There is strong evidence that anemia, the indicator used to identify those with iron deficiency anemia is more prevalent among low income children. In 2000, it was estimated that 12% of 1-2 year old children in low income households (i.e. < 185% of poverty) were anemic compared to 7% of 1-2 year olds nationally (Centers for Disease Control, 2002) More recent national estimates in 2008 document the prevalence of anemia among low income young children less than five years of age, receiving publically funded health or nutrition services to be 14.9%, representing an increase from 1999 which was 14.5% (Polhamus et al., 2009). This relatively high level of potential IDA is of concern because IDA can have consequent long and short term negative effects on behavior, memory, and attention (Lozoff, Beard, Connor, Barbara, Georgieff, & Schallert, 2006; Metallinos-Katsaras, Valassi-Adam, Dewey, Lonnerdal, Stamoulakatou, & Pollitt, 2004).

*Childhood obesity.* The prevalence of childhood obesity in the U.S. has been steadily rising in the general population, even among preschool-age children. Increases from 7.2% to 12.4% among 2-to 5-year-olds between 1988–1994 and 2003–2006 NHANES have been reported (Ogden, Carroll, & Flegal, 2008; Ogden, Flegal, Carroll, & Johnson, 2002). Moreover, preschool-aged low-income children have a higher prevalence of obesity compared to the general population (Polhamus et al., 2009). Based on the Centers for Disease Control and Prevention's Pediatric Nutrition Surveillance System (PedNSS), the prevalence of obesity in low-income 2- to

## 7-Maternal Mental Health

5-year-old children participating in publicly funded health and nutrition programs in 2007 was 14.9%, representing a relative increase of 34.5% since 1995 (Polhamus et al., 2009). Even more striking was the substantially higher combined prevalence of overweight and obesity among low-income pre-school aged children which reached a prevalence of 33% (Polhamus et al., 2009) compared to 24% of US preschool-aged children in the general population (Ogden et al., 2008).

Recently, the National Center for Health Statistics examined obesity prevalence among children and adolescents by several important sociodemographic variables including income. This study found that obesity is more common among low income compared to higher income children and adolescents; however, the effect of income varied by race (Ogden & Carroll, 2010). In 2007-2008, almost 17% of children and adolescents between the ages of 2 and 18 were obese. Among non-Hispanic white boys and girls, those who live in households with incomes with less than 130% of poverty had a significantly higher prevalence (20.7% and 18.3% respectively) than those living in households reporting incomes that were  $\geq$  350% of poverty (10.2% and 10.6% respectively). No significant trend in prevalence by income, however, was found among non-Hispanic black or Mexican American boys or girls (NCHS, 2010). It is widely acknowledged that childhood overweight and obesity are high priority public health problems in the U.S. (Ogden et al., 2002; Ogden et al., 2008) and worldwide (Wang & Lobstein, 2006), because of their magnitude, concurrent and long-term health consequences (Freedman, Khan, Dietz, Srinivasan, & Berenson, 2001; James, Lessen, & the American Dietetic Association, 2009; Sorof & Daniels, 2002) and persistence into adulthood (Guo, Roche, Chumlea, Gardner, & Siervogel, 1994; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997).

*Overall Physical Health.* Low-income also has been implicated in ratings of overall child physical health. In one study examining the role of income with child health status, Currie and

## 8-Maternal Mental Health

Wanchuan (2007) found that only 70% of children living in poor families were reported to be in good health as compared to 86.9% of their higher income counterparts. Larson and colleagues also report that low-income significantly increased the odds that mothers rated their children as having poorer overall health in both bivariate and multivariate analyses of a large, nationally representative sample of children ages 0-17, assessed through the National Survey of Children's Health (Larson, Russ, Crall, & Halfon, 2008).

*Food security.* Food security refers to access by all people at all times to enough food for an active and health life. Food security, at a minimum, requires that individuals have enough food (quantity) and nutritionally adequate food (quality). Food security is measured using a household food security survey that estimates the degree to which households report having limited access to food during the previous 12 months (Bickel, Nord, Price, Hamilton, & Cook, 2000). Estimates of household food security, one measure of a household's access to adequate and nutritious food, suggest that, in 2009, 14.7% of US households were food insecure (Nord Coleman-Jensen, Andrews, & Carlson, 2010). In addition, rates of food insecurity are markedly higher for households with young children (22.9% for children under 6), and for female headed households (36.6%) (Nord et al.) While 21.3% of households with children were food insecure, in approximately half of those households (10.7%), only the adults reported experiencing food insecurity while in the remaining 10.6% of households, both children and adults experienced food insecurity (Nord et al.). Rates of food insecurity among children remained relatively stable between 1998 and 2008 (between 8-9%), but have risen sharply over the past 2 years (White & Tampi, 2010).

A significant body of research has established strong associations between food insecurity, hunger and a range of health, behavioral and psychosocial outcomes (Center on



## 9-Maternal Mental Health

Hunger & Poverty, 2002; Jyoti, Frongillo, & Jones, 2005; Sullivan & Choi, 2002) among otherwise well-nourished populations (Jyoti et al., 2005). Specifically, food insecurity among school-aged children has been associated with impaired growth (Casey, Szeto, Lensing, Bogle, & Weber, 2001), increased behavioral problems (Murphy, Wehler, Pagano, Little, Kleinman, et al., 1998), as well as lower achievement test scores and more grade repetitions (Alaimo, Olson, & Frongillo, 2001).

*Food security and nutritional status.* Food insecure households experience malnutrition and other nutrition-related health problems at higher rates compared with food secure households given comparable other risk factors (Gundersen & Kreider, 2009). Some studies have found that household or child food insecurity significantly increased the risk of IDA in young children (Skalicky, Meyers, Adams, Yang, Cook, & Frank, 2006). Another study suggested that household food security status modified the impact of breastfeeding on child health outcomes attenuating many of the protective benefits commonly observed) (Neault, Frank, Merewood, Philipp, Levenson, Cook, et al., 2007). Specifically, any breastfeeding was protective for poor child health, for hospital admission and maintenance of weight for height z-scores, but only among those who were from food secure households (Neault et al.). Although there is a paucity of research on the effects of food insecurity on stunting in children living in the U.S., research from low income countries indicate that children living in food insecure households are more likely to experience stunting than those living in food secure households (Hackett, Melgar-Quinonez, & Alvarez, 2009).

Household food insecurity has consistently been associated with increased risk of obesity in women (Olson, 2005); however, results among children have been contradictory. Of five longitudinal studies, three of which used the Early Childhood Longitudinal Study-Kindergarten

## 10-Maternal Mental Health

(ECLS-K) cohort (Bronte-Tinkew, Zaslow, Capps, & Horowitz, 2007; Dubois, Farmer, Girard, & Porcherie, 2006; Jyoti et al., 2005; Rose & Bodor, 2006; Winicki & Jemison, 2006) three found that food insecurity or insufficiency increased the risk of high weight status (Bronte-Tinkew et al., 2007; Dubois et al., 2006; Jyoti et al., 2005), one found it decreased risk (Rose & Bodor, 2006), and one found no association (Winicki & Jemison, 2006).

### Poverty and Maternal Mental Health

Low-income mothers face chronic and daily stressors that challenge their emotional and mental health. Environmental correlates of poverty, such as chaotic living conditions, uncertain access to healthy food (Larson, Story, & Nelson, 2009), unsafe neighborhoods (Hill & Herman-Stahl, 2002), and limited health care access, along with the daily struggles to clothe, house, feed and keep children healthy cause poor mothers to endure substantially greater economic pressure and stress than mothers in other socioeconomic (SES) strata. Given this backdrop, it is not surprising that low income mothers evidence greater mental health issues as compared to the general population. Studies comparing poor or welfare mothers to non-poor populations report consistently higher rates of mental health disorders, including mood disorders, anxiety, and substance abuse (Rosen, Spencer, Tolman, Williams & Jackson, 2003), depression (Lorant, Deliege, Eaton, Robert, Philippot, & Anseau, 2003), anxiety (Kessler et al., 2004) and substance use disorders (Bassuk, Buckner, Perloff, & Bassuk, 1998). Less is known about the relationship between poverty and other common mental health disorders among adults, such as impulse control and social phobias (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005).

In this chapter, we focus on two of the most prevalent and well-researched mental health disorders among poor mothers: depression and anxiety. Often labeled together as psychological distress, depression and anxiety represent two distinct but comorbid mental health disorders

## 11-Maternal Mental Health

(Horwitz, Briggs-Gowan, Storfer-Isser, & Carter, 2007; Kessler, Gruber, Hettema, Hwang, Sampson, & Yonkers, 2008). While clinicians and scholars typically make distinctions between depression and anxiety, results from the National Comorbidity Survey indicate that comorbid depression and anxiety is the rule rather than the exception in up to 60% of individuals presenting with Major Depressive Disorder (MDD; Kessler, Berglund, Demler, Jin, Koretz, Merikangas, et al., 2003). Nonetheless, we review the research on depression and anxiety as separate constructs, when possible. In instances where the two cannot be separated either empirically or conceptually, we use the broader term of psychological distress to indicate the combined presence of these common mental health issues.

The *Diagnostic and Statistical Manual of Mental Disorders, 4th edition, Text Revision* (DSM IV-TR), defines MDD as a drop in interest or pleasure in most activities, for at least two weeks. This mood must represent a change from the person's normal mood and an individual's functioning (i.e. social, occupational, educational) must be negatively impaired by the change in mood. The depressed mood and/or loss of interest and pleasure in daily activities may be accompanied by a number of the following symptoms: sadness, changes in weight, insomnia or hypersomnia, psychomotor agitation, fatigue or loss of energy, feelings of worthlessness or excessive guilt, diminished ability to think or concentrate or indecisiveness, and recurrent thoughts of death or suicidal ideation (American Psychiatric Association, 2000). According to the DSM IV-TR, Generalized Anxiety Disorder (GAD) is characterized by excessive anxiety and worry about a number of events or activities occurring more days than not for a period of at least 6 months. In these instances, individuals find it difficult to control the worry and the anxiety. Further, anxiety and worry are accompanied by at least 3 additional symptoms: restlessness, being easily fatigued, difficulty concentrating, irritability, muscle tension, and disturbed sleep.

## 12-Maternal Mental Health

As noted earlier, GAD frequently co-occurs with other mood disorders such as MDD or Dysthymic Disorder, and with other anxiety disorders such as Panic Disorder and Social Phobia.

Common methods used to assess psychological distress consist of in-depth clinical interviews and short or long self-report checklists. For depression, typical measures include standardized self-report, multi-item symptom checklists such as the 20-item Center for Epidemiological Study Depression Scale (CES-D, Radloff, 1977) or the Beck Depression Inventory II (Beck, Steer & Brown, 1996), subsets of items from these larger checklists (Paulson, Dauber, & Leiferman, 2006; Press, Fagan, & Bernd, 2006), and clinical interviews such as the World Health Organization's Composite Diagnostic Interview (CIDI, Robins, Wing, Wittchen, Helzer, Babor, Burke, et al., 1988). To assess anxiety in individuals, the 40-item State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970), the 21-item Beck Anxiety Inventory (Beck, & Steer, 1993), the 14-item Hamilton Anxiety Scale (Hamilton, 1959), the 20-item Zung Self-Rated Anxiety Scale (Zung, 1971), and the GAD-7 a 7 item indicator of Generalized Anxiety Disorder (Spitzer, Kroenke, Williams, & Löwe, 2006) represent common instruments. In addition, some scales include depression and anxiety, such as the 53-item Brief Symptom Index (Derogatis & Spencer, 1982).

### *Poverty and maternal depression*

Regardless of the type of measure used, being female and poor separately increase one's likelihood of experiencing depression. In the National Comorbidity Study Replication (NCS-R), which used clinical interviews to determine MDD in the U.S., life time and 12 month depression rates among adults were significantly higher for women as compared to men (Kessler, Berglund, Demler, et al., 2005). Significant positive associations between clinical levels of depression and living in or near poverty also have been found with the NCS-R (Kessler et al., 2003) and other

### 13-Maternal Mental Health

samples (Horwitz et al., 2007; Lorant et al., 2003). As might be expected, low-income women exhibit higher rates of depressive symptoms than adults in most, but not all studies (Garbers, Correa, Tobier, Blust, & Chiasson, 2010; cf., Lennon, Blome, & English, 2002).

Add parenting of young children to this mix and the risk for depression elevates further. In fact, the post-partum period may be an especially vulnerable time for low-income mothers, as studies report high post-partum depression (PPD) rates such as 60% in a Medicaid sample (Walker, Timmerman, Kim & Sterling, 2002), and 51% in women receiving Special Supplemental Nutrition Program for Women, Infants, and Children (WIC; Boury, Larkin, & Krummel, 2004) as compared to a 10-15% prevalence rate nationally (Moses-Kolko & Roth, 2004). As mothers who experience PPD double their likelihood for subsequent episodes of depression (Cooper & Murray, 1995), these elevated rates of PPD among low-income mothers are of grave concern.

Once past the post-partum period, depressive symptoms appear to decline although low-income mothers of younger children still evidence higher risk than higher income mothers. For example, studies with mothers of children under 3 indicate about 17% report elevated levels of depression (Horwitz et al., 2007; McLennan, Kotelchuck, & Ho, 2001). In contrast, research with mothers of young children who also live in poverty find substantially higher rates, ranging from 33-50% (Casey et al., 2004; Chung, McCollum, Elo, Lee, & Culhane, 2004; Malik, Boris, Heller, Harden, Squires, Chazan-Cohen, et al., 2007). These elevated rates have been found with low-income preschool samples as well. Over 40% of Head Start mothers in a large national sample showed elevated depressive symptoms (Lanzi, Pascoe, Keltner, & Ramey, 1999). In fact, a longitudinal study found that low-income continues to predict higher maternal depressive symptoms up to 10 years after the child's birth (Seto, Cornelius, Goldschmidt, Morimoto, &

## 14-Maternal Mental Health

Day, 2005). Moreover, elevated maternal depressive symptomology during the first 2 years of a child's life has been found to predict both recurrent depression and impaired parenting practices for the next ten years of the child's life (Letourneau, Salmani, & Deffett-Leger, 2010).

Although poor minority mothers also experience elevated rates of depression (Chaudron, Kitzman, Peifer, Morrow, Perez, & Newman, 2005; Kurz & Hesselbrock, 2006; Lehrer, Crittenden, & Norr, 2002), it is unclear whether minority status further elevates the likelihood of depression among poor mothers. For example, among low-income single mothers, African American women were more than twice as likely to report a psychiatric disorder (including depression and anxiety) as compared to white women (Rosen, Spencer, Tolman, Williams, & Jackson, 2003). In contrast, another study found that African American mothers of children under 13 years of age reported significantly lower levels of depressive symptoms than white mothers, although depression scores between whites and Hispanic mothers did not significantly differ in this sample. After interactions between welfare and employment were included in the analyses, however, the lower likelihood for depression among black mothers disappeared (Press et al., 2006). Such findings have led some commentators to argue that minority status does not produce any independent effects on depression (Currie, 2005).

Thus, the bulk of longitudinal and cross-sectional studies provide evidence that the experience of poverty substantially contributes to the development or deepening of depressive symptoms among low-income mothers around the time of a child's birth and during the early child rearing years, with possible effects extending through middle childhood and adolescence. Additionally, other correlates of poverty, such as maternal educational attainment (Lorant et al., 2003), maternal age (Kurz & Hesselbrock, 2006; Volker & Ng, 2006), receipt of public assistance (Lehrer et al., 2002; Rosen et al., 2003), and economic pressure (Jackson et al., 2000;

## 15-Maternal Mental Health

Parke, Coltrane, Duffy, Buriel, Dennis, Powers et al., 2004) are implicated in the etiology of depression. Of course, depression itself may increase one's likelihood of falling into poverty although there is less current evidence for this pathway (Lorant et al., 2003). Overall, poverty's robust relationship with maternal depression confirms the necessity of investigating maternal psychological distress as a key mechanism that connects poverty to the nutritional risk and poor health observed in low-income children.

### *Poverty and maternal anxiety*

Anxiety disorders are the most common mental disorders occurring in approximately 40 million adults (Kessler, Chiu, Demler, Merikangas, & Walters, 2005). Implications for women are noteworthy as anxiety disorders are more prevalent among women than men with an estimated 30% of women experiencing some type of anxiety disorder during their lifetime (Kessler, McGonagle, Zhao, Nelson, Hughes, Eshleman, et al., 1994). For women, the presence of anxiety commonly occurs during the post partum period, thus making motherhood a particularly vulnerable time in a woman's life (Britton, 2008; Britton 2005; Wenzel, Haugen, Jackson, & Robinson, 2003). In a longitudinal investigation of anxiety during the early post partum period, rates of anxiety increased over the first few weeks of motherhood resulting in 31.7% of mothers experiencing moderate to severe anxiety at one month after childbirth (Britton, 2008). In another study, Wenzel and colleagues (2003) interviewed mothers at 8 weeks postpartum in a community based setting. Their results revealed that 4.4% of the mothers met the criteria for DSM IV diagnosis.

Like depression, maternal anxiety occurs more frequently for low-income mothers as compared to higher income mothers (Kessler et al., 1994; Kurz & Hesselbrock, 2006; McLeod & Kessler, 1990). In fact, a study of 127 ethnically diverse mothers receiving WIC found that

## 16-Maternal Mental Health

anxiety symptoms were more prevalent than depressive symptoms, with 56.5% of women in the sample reporting one or more indicators of anxiety (Kurz & Hesselbrock, 2006). It is important to note that high rates of comorbidity were present in this study as 82.2% of women with symptoms of depression also experienced symptoms of anxiety, and 57.8% of women with symptoms of anxiety also reported symptoms of depression. Finally, some research suggests that early anxiety has longitudinal effects for individuals of lower income status with a history of psychiatric problems (Bienvenu & Stein 2003), and for mothers with low educational attainment who experience post partum anxiety (Britton, 2008).

As with depression, low-income is not the only demographic characteristic associated with maternal anxiety. At least two studies have documented a relation between low maternal education and the presence of anxiety post partum (Britton, 2008; Britton, 2005). For example, Britton (2008) found that low maternal education, a history of depressed mood, high perceived perinatal stress, and high trait anxiety were predictive of anxiety at a later time. More broadly, indicators of stress, including anxiety, were significantly elevated for low-income African-American mothers as compared to their white and Hispanic counterparts (Hurley, Black, Papas, & Caufield, 2008). Thus, maternal education and ethnicity may influence the mechanisms through which low income leads to maternal anxiety.

### Maternal Psychological Distress, Parenting, and Child Health and Nutrition

We know that poor maternal mental health has long been associated with negative outcomes for children, especially in the areas of behavior, emotional health, and cognitive development (Ginsburg, Siqueland, Masia-Warner, & Hedtke, 2004; National Research Council and Institute of Medicine, 2009). Scholars are beginning to examine the influence of maternal mental health on the physical and nutritional health of poor children. As noted earlier, this new



## 17-Maternal Mental Health

area of scholarly attention is especially important given the high prevalence of anxiety and mood disorders among low-income mothers (Kessler, Chiu, et al., 2005), and the deleterious effects of poverty on children's physical health and nutritional status. Of the available research, maternal depression and its association with overweight and the food security status of low-income children and their households has been the most studied, with little attention given to maternal anxiety and other aspects of child health.

Indicative of the nascent status of the field, we could identify only one exemplar study that investigated the relationships between maternal psychological distress, parenting, and child health with longitudinal data. Working with the Early Childhood Longitudinal Study (ECLS-B) data, Bronte-Tinkew and colleagues find a significant association between elevated depressive symptoms and food insecurity, measured when the target child was 9 months old (Bronte-Tinkew et al., 2007). When the children were 2 years old, early maternal depression directly explained lower parental ratings of overall physical health but not child overweight, after adjusting for early food security status. Unlike other work in this area, the study did not find a concurrent association between maternal depression with parent-child interactions nor was depression directly associated with infant feeding practices (see Dennis & McQueen, 2009), operationalized as a combination of breastfeeding duration and timing of introduction of solid foods. The study did report an indirect path from depression to early food insecurity, to later child overweight. Early food insecurity was associated with less positive parenting practices, which correlated to poorer infant feeding practices. In turn, poorer infant feeding practices at 9 months explained child overweight at 2 years.

It should be noted that food security, depression, parenting, and infant feeding were measured concurrently in this study which prevents an estimation of the causal linkages among

## 18-Maternal Mental Health

these factors. In addition, all analyses entered food security status first, which would have removed any shared effect with depression on parenting practices or child health outcomes.

These study results underscore the complex relationship that may connect maternal depression and food security status to child physical and nutritional health, as well as the pressing need for studies that explicitly examine these longitudinal pathways. This state of affairs necessitates our examining the effects of maternal psychological distress on child health with research that investigates partial paths in this model. Overall, we find strong cross-sectional associations between maternal mental health and food insecurity, which appear to interact to influence child health, and less robust but suggestive trends that may link maternal mental health to some health-related behaviors, feeding practices, and coping strategies that, in turn, negatively affect child outcomes in families experiencing the stress of poverty.

### *Maternal Psychological Distress and Health Outcomes*

Many studies report direct associations between maternal psychological distress and poor child health in low-income families. For example, a nationally representative study of both physical and dental health of children from birth to 17 years of age, found that diminished maternal mental health, low-income, and black or Hispanic background increased the odds of child overweight and of lower maternal reports of very good child physical and dental health (Larson, Russ, Crall, & Halfon, 2008). Using a large convenience sample of low-income families of infants and toddlers, Casey and colleagues found that elevated depressive symptoms corresponded to poorer ratings of child health, and an increased likelihood of household food insecurity (Casey, Goolsby, Berkowitz, Frank, Cook, Cutts, et al., 2004). However, not all studies have found these associations. For example, food hardship, but not maternal depression,

## 19-Maternal Mental Health

corresponded to lower ratings of child health among low-income families of children ages 5-11 (Yoo, Slack, & Holl, 2009).

Of these outcomes, the most consistent evidence supports the connection between maternal psychological distress and food insecurity in low-income families. Cross-sectional data confirm a link between maternal psychological distress and household food insecurity among low-income families with infants (Casey, Simpson, Gossett, Bogle, Champagne, Connell, et al., 2006; Laraia, Borja, & Bentley, 2009), and preschoolers (Dubois et al., 2006; Whitaker, Phillips, & Orzol, 2006). Further, longitudinal studies confirm the depression-food security link, though with varying conclusions on the direction of effects (Bhargava, Jolliffe, & Howard, 2008; Heflin, Siefert, & Williams, 2005; London & Scott, 2005). This issue of causality, however, has been more thoroughly examined with a recent longitudinal study of low-income, rural mothers with children under 13 (Huddleston-Casas, Charnigo, & Simmons, 2008). Using a sophisticated structural equation model with 3 waves of data, the 3-year study found evidence for a bidirectional, causal relationship between food security and depression. That is, higher levels of maternal depression led to greater food insecurity while, at the same time, food insecurity caused symptoms of depression to increase for poor mothers.

Further, the interaction of maternal psychological distress and food insecurity in low income families has emerged as a potential predictor of one health outcome: child overweight. Gunderson and colleagues' (2008) research is instructive in this regard. Initial analyses of the relationship between food insecurity and overweight among over 1000 low-income US children ages 10 to 15 from the Three-City study revealed no significant associations, even though a quarter of the food insecure children were also overweight. Separate analyses assessing the impact of gender, race, and income yielded the same results (Gunderson, Lohman, Eisenmann,

## 20-Maternal Mental Health

Garasky, & Stewart, 2008). However, more recent analyses of this same population revealed that maternal stressors, including depression and anxiety as measured with the Brief Symptom Inventory, interacted with food security status to increase the likelihood of child overweight and obesity for food insecure adolescents (Lohman, Stewart, Gundersen, Garasky, & Eisenmann, 2009). An interaction effect also was found with poor children and their families who participated in the 1999-2002 National Health and Nutrition Examination Survey (NHANES 2). Using a broader scale of maternal stressors that included stressors related to mental and physical health, finances and family structure, food security status and maternal stressors interacted to explain overweight status for children ages 3-10 though not for adolescents ages 11-17. This study found, however, that young children in food secure households with greater maternal stress were more likely to be overweight than similar children in food insecure households (Gundersen, Lohman, Garasky, Stewart, & Eisenmann, 2008).

### *Maternal Psychological Distress and Parenting*

Thus, it appears that maternal psychological distress, both alone and in concert with food security status, influences certain aspects of child health and nutritional status though questions remain as to how, why, and when this occurs. To try to answer these questions, this section discusses the effects of psychological distress on parenting domains that may be associated with poor child health including maternal health related behaviors, such as well-child visits, parental feeding strategies, including breastfeeding, and parental coping strategies around access and availability of nutritious food.

*Health Related Behavior.* Maternal psychological distress may lead to poor child health if it reduces or prevents mothers from engaging in health practices known to optimize a child's physical and nutritional health (Wachs, 2008). In the post-partum period, greater depressive

## 21-Maternal Mental Health

symptoms are associated with an increased likelihood of poor infant sleep and non-optimal feeding practices, including failure to breastfeed, putting child to bed with a bottle, waiting until the child is asleep before putting to bed, and placing the child on his or her back to sleep, among a large, national sample of families in the ECLS-B study (Paulson et al., 2006). Limited breastfeeding (Owen, Martin, Whincup, Smith, & Cook, 2005) and inadequate sleep in children (Bell & Zimmerman, 2010) have been linked to child weight status, suggesting that such parental behaviors contribute to child growth and nutritional status.

Other behaviors that may indirectly influence a child's overall health have been noted among low-income, depressed mothers. Two prospective studies found that, relative to poor non-depressed mothers, poor depressed mothers were less like to place an infant on the back to sleep, and reported more infant hospitalizations during the first year of life (Chung et al., 2004). Further, low-income children of depressed mothers were less likely to receive well-child visits and immunizations, and had increased use of the emergency room during the child's first three years (Minkowitz, Strobino, Scharfstein, Hou, Miller, Mistry, et al., 2005). Longitudinal research with nationally representative populations demonstrates that smoking, inconsistent car seat usage, and non-use of child vitamins are more common among depressed mothers, as well as among those with lower income and educational attainment, more children, and single parenthood (Leiferman, 2002). Similarly, a study of preschool mothers found that maternal depression reduced the use of four prevention practices, including car seat usage and covering of electrical outlets, as did low-income and single parenthood (McLennon & Kotelchuck, 2000). While it is likely that failure to engage in these practices impact child health, especially nutrition-related outcomes such as iron-deficiency anemia and growth, no study assessed these outcomes.

## 22-Maternal Mental Health

To this mix, we also include maternal behaviors that affect a child's access to television and other passive entertainment sources as these have been linked to nutritional status. Time spent watching television and videos is significantly associated with higher BMIs in older school age children (Boumtje, Huang, Lee, & Lin, 2005), and overweight among preschoolers (Dennison, Erb, & Jenkins, 2002), as is having a TV in one's bedroom (Dennison et al.). Further, black and Hispanic children, who are more likely to be poor, have higher rates of TV viewing as compared to white children (Dennison et al.). It is unclear why certain groups of children have greater television access; however, research has identified elevated maternal depressive symptomatology as a key correlate of heavy television viewing among low-income preschoolers (Burdette, Whitaker, Kahn, & Harvey-Berino, 2003; Conners, Tripathi, Clubb, & Bradley, 2006) which may explain some of the associations noted above.

Overall, maternal depression appears to impede health related behaviors in low-income mothers of young children though whether these behaviors then result in poorer child health is unclear. Much remains unanswered, including whether maternal depression impacts critical health related behaviors when children are older, and how other correlates of poverty, such as maternal age and education, family size, minority status, and partner support, affect this relationship. Perhaps of greater concern is our limited understanding of maternal anxiety and its effects on health-related behaviors. We could not find any studies assessing this relationship, even though maternal anxiety has been associated with health issues for poor children, including asthma, headaches, and abdominal pains (Feldman, Ortega, Koinis-Mitchell, Kuo, & Canino, 2010).

*Feeding Practices.* A second way that parental psychological distress may influence child physical and nutritional health is through parental feeding practices that contribute to the

## 23-Maternal Mental Health

development and continuation of feeding problems in children. Here, the evidence supports a connection between maternal mental health and feeding practices of young children. What is more contentious is whether and how specific child feeding strategies (i.e., pressure, restriction, control, monitoring) or styles (i.e., authoritarian, authoritative, permissive, uninvolved) impact child health and nutrition. In contrast, the link between maternal mental health, breastfeeding practices, and child health has been more firmly established among the general population, with supportive evidence for poor mothers as well.

Several studies suggest that psychological distress impacts maternal feeding styles, especially of infants. Murray, Creswell, & Cooper (1996) found that mothers with emotional difficulties (i.e., anxiety and depression) interact differently with their infants which may result in feeding interaction problems. In essence, the data from this study suggests that maternal mood may lead to mother's use of maladaptive feeding strategies. The work of Hurley and colleagues supports this hypothesis (Hurley, Black, Papas, & Caufield, 2008). In their study of low-income WIC mothers, elevated stress, depression and anxiety each corresponded to forceful and uninvolved feeding styles. In addition, mothers with elevated depression showed greater use of indulgent feeding styles while those with anxiety used restrictive feeding styles. Moreover, Farrow & Blisset (2005) report a similar association between maternal anxiety and controlling practices, including food restriction in infants. These findings parallel work from Mitchell, Brennan, Hayes, and Miles (2009), which found that parental anxiety contributed significantly to the prediction of maternal feeding practice restriction. Further, those mothers who reported experiencing higher levels of depression, anxiety, and stress or being less satisfied in their role as a parent reported using higher levels of authoritarian parental feeding style as opposed to mothers who reported higher levels of parenting efficacy. Ammuaniti and colleagues (2004)

## 24-Maternal Mental Health

reported that children with feeding problems had mothers with higher levels of anxiety, depression, hostility and use of inappropriate feeding practices. Further, children of these mothers also experienced greater levels of anxiety/depression, more aggressive behavior, and more somatic complaints.

A growing literature base has examined the relationship between these feeding practices and a variety of outcomes on the part of the child (e.g., nutritional intake, weight, BMI, dietary quality) with conflicting results. For example, controlling feeding strategies have been linked with unhealthy weight status in children (Ventura & Birch, 2008) but with lowered weight among Latino children (Larios, Ayala, Arredondo, Baquero, & Elder, 2009). A review of parent-child feeding strategies noted significant correlations between parental feeding strategies and child outcomes in 19 of 22 studies; however, feeding restriction, not control, was related to increased eating and weight status (Faith, Scanlon, Birch, Francis, & Sherry, 2004). Similarly, studies assessing the impact of parenting styles have produced inconsistent findings. For example, Baughcum and colleagues found no relationship between feeding styles and child weight (Baughcum, Powers, Johnson, Chamberlin, Deeks, Jain, et al., 2001). Conversely, authoritarian parenting, as compared to authoritative parenting, was associated with reduced fruit and vegetable intake among children (Patrick, Nicklas, Hughes, & Morales, 2005). To cloud the picture further, it is unclear whether restrictive and permissive feeding strategies occur in response to the child's weight status (Moens, Braet, & Soetens, 2006) or to parental perceptions that the child is overweight (Francis, Hofer & Birch, 2001).

Research is beginning to move beyond these broad conceptions of feeding styles to investigate whether specific components of these food behaviors influence child health. For example, in a study of food security status and parental feeding strategies among low income



## 25-Maternal Mental Health

black families, food insecure households were more likely to use compensatory strategies, such as energy boosters and appetite stimulants, than food secure households. Such strategies, despite their potential increased costs, are interpreted as reflecting parents' concern about their children's undernutrition (because of food insecurity), leading parents to engage in behaviors that put their children at risk for overweight (Feinberg, Kavanagh, Young, & Prudent, 2010). In a study attempting to develop a new measure of food behaviors during mealtimes, maternal positive persuasion, providing daily fruits and vegetables and making fewer special meals, were associated with children's increased consumption of fruits and vegetables while less positive persuasion, less insistence on eating, more modeling of snacks, and the use of fat reduction strategies were associated with higher BMIs in children (Hendy, Williams, Camise, Eckman, & Hedemann, 2009).

Overall, while maternal psychological distress appears to reduce the use of positive practices around child feeding, notably increased use of restrictive, forceful, and indulgent strategies, the effect of such strategies on child health and nutrition remains unclear. This lack of clarity stems from many issues, especially the correlational nature of much of this research which severely limits our ability to understand whether parental practices actively contribute to health outcomes of the child or whether they are more likely the response of the parent to the child's behavior or other characteristic (e.g., weight, health). Further, our knowledge is hindered by variation in methods to assess and definitions of parenting feeding practices, along with the inconsistent inclusion of factors that have the potential to modify any of these reported relationships, such as child age, ethnicity/race, cultural practices, and income.

One specific infant feeding practice believed to produce health benefits for children is maternal breastfeeding. In 2007, the World Health Organization systematically reviewed the

## 26-Maternal Mental Health

evidence for a long term effect of breastfeeding on overweight and obesity (Hora, Bahl, Martines, & Victoria, 2007). Taking into account possible publication bias and confounding maternal social, demographic and health factors, they concluded that breastfeeding may have a small protective effect on obesity prevalence. Indeed, one meta-analysis highlighted by the review demonstrated a 4% reduction in odds of overweight with each month increase in breastfeeding duration (Hora et al., 2007). It should be noted that not all researchers agree; one critical review of these findings (sponsored by the International Formula Council) concluded that the evidence for a causal association was not sufficient to draw this conclusion (Cope & Allison, 2008).

Given the strong association between income and breastfeeding found in the National Immunization Survey results (Li, Darling, Maurice, Barker, & Grummer-Strawn, 2005), low-income women are already at risk for reduced rates and duration of breast feeding. When combined with evidence that maternal depression has been found to decrease breastfeeding duration among women overall (Kendall-Tackett, 2005; McLearn, Minkovitz, Strobino, Marks, & Hou, 2006; Paulson et al., 2006), mothers experiencing both poverty and depression would appear to be highly likely to engage in limited amounts of breastfeeding. Indeed, this relationship has been found in at least one large, prospective study where low-income mothers rated as severely depressed with the CES-D terminated breastfeeding significantly earlier than non-depressed mothers even though both groups had similar rates of breastfeeding initiation (Vericker, Macomber, & Golden, 2010). Not all research supports this finding as one community-based study asking low-income mothers to recall how long they breastfed reported no significant relationship between maternal depression and breastfeeding for at least one month;

however, a retrospective design and truncated measurement reduce the reliability of this finding (Chung et al, 2004).

It should be noted that a wide variety of factors associated with breastfeeding also covary with income and depression. For example, both paternal (Ludvigsson & Ludvigsson, 2005; Murray, Ricketts, & Dellaport, 2007) and maternal education have been found to be associated with breastfeeding initiation and duration (Di Napoli, Di Lallo, Pezzotti, Forastiere., & Porta, 2006; Heck, Braveman, Cubbin, Chavez, & Kiely, 2006; Hurley, Black, Papas, & Quigg, 2008; Ludvigsson & Ludvigsson, 2005). Maternal employment may account for reduced breastfeeding among lower income mothers, given employment's association with reduced breastfeeding duration (Cooklin et al., 2008; Kehler et al., 2009; Hurley et al., 2008; Ludvigsson & Ludvigsson, 2005). Finally, cultural factors such as maternal ethnicity and race correspond to breastfeeding rates, with Hispanic mothers demonstrating higher rates of breastfeeding as compared to other racial and ethnic groups, such as non-Hispanic whites and African Americans (Heck et al., 2006; Hurley et al., 2008; Li et al., 2005). Research indicating that poor Hispanic mothers of infants have lower depression levels than similar parents of other backgrounds may help to explain this last finding (Vericker et al., 2010).

*Food-Related Coping Strategies.* A promising yet under-investigated pathway between poverty, maternal mental health, and child health and nutrition concerns coping strategies that low-income mothers may use as a direct result of limited income and economic access to resources. As noted by Wachs (2008), “[r]estriction of food choices for low income families will require active involvement by mothers to provide the best possible diet at the lowest cost to her family” (51). A mother’s ability to actively engage in effective strategies to acquire nutritious

## 28-Maternal Mental Health

food may be seriously compromised by the psychological distress brought on by poverty, leading to a lower quality of diet and related health concerns for low-income children.

Clearly, low-income families face serious constraints around accessing nutritious food supplies; however, few studies investigate the role mental health plays in this process, nor whether the choices brought on by these constraints affect a child's nutritional status or overall physical health. We do know that low-income households attempt to compensate for limited purchasing power by minimizing cost while maximizing purchases (Drewnowski & Specter, 2004). In these households, a shopper for a family may be more inclined to purchase higher energy density, higher carbohydrate foods that are lower cost in order to stretch the food dollar. Econometric studies demonstrate that the increasing constraints of costs have repercussions for the types of food purchased and consumed; consumption of fruit and vegetable as well as dairy and meat declines and the purchase of cereals, sweets and foods with added fats increases (Darmon, Ferguson, & Briend, 2002). These strategies determine what goods are available in households which may then affect child overweight, food insecurity, or both.

Decisions about food purchases also are affected by factors beyond cost – such as access and availability. Studies of food access among low-income populations have reported that low income households have greater difficulties in accessing a variety of healthful foods as compared to moderate or upper income households (Jetter & Cassady, 2006). More specifically, availability of healthier foods is less consistent and widespread among urban grocery stores and, in general, costs more than in suburban stores (Kaufman & Karpati, 2007). Furthermore, the supermarkets and fast food restaurants in low income and African American neighborhoods provide less access to healthy foods than stores in upper income neighborhoods (Baker, Schootman, Barnidge, & Kelly, 2006). Because low income households tend to live further from

## 29-Maternal Mental Health

larger grocery stores (where healthy foods are more readily available and oftentimes less expensive), poor mothers often must decide between shopping at higher priced convenience stores or spending additional money on transportation (Kaufman & Karpati).

Studies do suggest that low-income shoppers identify many strategies to attempt to compensate for these barriers to both quantity and quality of food. In one study, low income shoppers asked to reduce their budget articulated several methods to save money such as buying foods close or past their 'due date', decreasing purchases of specific and preferred foods, and shifting to generic brands they considered lower quality (Inglis, Ball, & Crawford, 2009). A study of food pantry users found that as money for food became more scarce, women had a variety of strategies to save money including shopping in a variety of stores, using coupons, substituting cheaper foods (e.g., powdered milk, less desirable cuts of meats), and using more filler (e.g., pasta and potatoes) (Hoisington, Shultz, & Butkus, 2002). Clearly, many of these strategies also require effort and planning, especially if the parent is working.

It seems likely that elevated psychological distress will function to decrease a parent's use of these coping strategies, potentially leading to even lower quality and quantity of food in poor households. Indeed, the finding that the energy intake of low income mothers declines during the month and is significantly less nutritionally adequate than the diets of their young children (McIntyre, Glanville, Raine, Dayle, Anderson, et al., 2003) suggests that a circular process may exist between inadequate nutrition for mothers and their experience of psychological distress, which may further reduce their engagement in proactive coping strategies. However, more research needs to be completed to support these suppositions and assess how food-related coping strategies influence child growth, nutrition, and overall health.

### *Contributing Mechanisms*

### 30-Maternal Mental Health

Any discussion of how maternal mental health may lead to poor child health must consider the broader factors associated with these processes, in particular, the role of biology, the bidirectional relationships between these domains, and correlates of poverty that may moderate these relationships. While an extensive consideration of these issues is beyond the scope of this chapter, we briefly highlight some of this literature below.

*Biological-genetic factors.* Clearly, genetics and biology function to explain some part of the pathway from maternal psychological distress to poor child health and nutrition. For example, it may be that a genetic predisposition for psychological distress also [is accompanied by] signals a stronger genetic vulnerability for impaired physical health, which then can be passed to one's offspring. Indeed, this theory has been offered as one way maternal depression leads to child depression and psychopathology (Goodman & Gotlib, 1999). Some evidence of a genetic transmission exists in the area of child overweight. For example, elevated maternal depressive symptoms has been linked to higher maternal obesity (Davis, Young, Dais, & Moll, 2008), though a causal pathway has not been established (Atlantis & Baker, 2008). Further, studies have found that maternal obesity, which reflects both environmental and biologic factors, is associated with child overweight in young children (Davis et al., 2008) and adolescents (Zeller, Reiter-Purtill, Modi, Gutzwiller, Vannatta & Davies, 2007). For example, a study of Mexican American preschool aged children found that child birth weight and maternal BMI were more predictive of child overweight than feeding practices (Melgar-Quinonez & Kaiser, 2004). Unfortunately, the vast majority of research reviewed in this chapter did not assess the role of biological factors, aside from the occasional inclusion of maternal weight status. This omission is critical to address as failure to assess biological contributions may result in findings that

## 31-Maternal Mental Health

overstate the importance of environmental factors on child health and nutrition. Interventions stemming from such studies may be destined to fail or produce smaller than expected effects.

*Bidirectional relationships.* Although our discussion centers on how maternal mental health may lead to parenting practices that, in turn, foster negative outcomes for low-income children, we must acknowledge that these domains will, to some degree, operate in a bidirectional fashion. For example, child weight (Francis et al., 2001) and food security may impact both feeding practices and depressive symptoms of mothers. As noted earlier, one longitudinal study identified a bidirectional relationship between maternal depression and food insecurity among low-income families (Huddlestone-Casas et al., 2008). It also seems likely that psychological distress in low-income parents will increase further if children are experiencing poor health or nutrition. In order for the field to better understand these relationships, future research must emphasize careful, longitudinal designs that can assess the bidirectional contributions of such variables.

*Moderating and mediating factors.* As noted throughout this chapter, several factors that co-vary with poverty also may affect maternal mental health, parenting practices, and child health and nutrition. Prominent among these factors are demographic correlates of poverty, including race/ethnicity, educational attainment, marital status, family structure, employment status, and gender. To these, we wish to add neighborhood conditions and maternal social networks as two key factors that may serve to enhance or diminish the effects of poverty on poor mothers' mental health and the health of their children. Neighborhood conditions often associated with poverty, such as violence, limited nutritional and recreational resources, and health hazards (Lovasi, Hutson, Guerra, & Neckerman, 2009), will most likely produce harmful direct effects on maternal mental health, parenting practices, and child health. In contrast,

## 32-Maternal Mental Health

positive maternal social networks that increase access to concrete goods and emotional support may help to offset the negative effects of poverty and depression on the family system (Sequin, Potvin, St. Denis, & Loiselle, 1999; Lee et al., 2009). These last two factors now receive considerable attention in research on child behavior and deserve equivalent consideration in studies of child health and nutrition.

### Conclusion

The family stress framework established by Conger and others (Conger, 2005; Conger et al., 2002) fits with much of the research examining the relationship between maternal mental health with child health and nutritional risk, yet a good deal remains to be confirmed. The heightened likelihood that poverty will be accompanied by maternal psychological distress means that mothers with the fewest economic resources frequently struggle with depression and anxiety (Kessler et al., 2003), especially when their children are young (Kurz & Hesselbrock, 2006). Both longitudinal (Huddleston-Casas et al., 2008) and cross-sectional research (Bhargava et al., 2008) establish that maternal psychological distress and food insecurity co-occur in low-income families, and may intensify the effects of each other. By itself, maternal psychological distress has been linked to poorer child health (Larson et al., 2008) and, in concert with food insecurity, appears to increase the likelihood of child overweight among poor families (Gundersen, Lohman, Garasky, et al., 2008). In the one study we found that examined the mechanisms linking mental health to these outcomes, depression and food security worked together to undermine parent-child interactions, leading to negative child feeding practices and, in turn, an increased likelihood of child overweight (Bronte-Tinkew et al., 2007).

It is unclear if all child health and nutrition outcomes fit this model. In particular, we did not find evidence that maternal psychological distress elevated the incidence of iron-deficiency



### 33-Maternal Mental Health

anemia or restricted child growth, including underweight and short stature, among low-income U.S. families. In the case of restricted child growth, relatively few U.S. children experience this phenomenon which may explain our failure to find an association, though maternal depression has been linked to restricted child growth in developing countries (Rahman, Bunn, Lovel, & Harrington, 2004; Surkan, Ryan, Vieira, Berkman, & Peterson, 2007) and among low-income populations in the United Kingdom (cf., Stewart et al., 2007).

Few studies examined the full pathway connecting maternal psychological distress to parenting strategies that, in turn, lead to reduced child physical health in low-income families. Our exploration of potential underlying mechanisms that explain these relationships focused on three aspects of parenting: health related behaviors, feeding strategies, and food-related coping strategies. An expanding research base supports maternal depression as contributing to a variety of health related behaviors that may put young children at risk for poor health and nutrition, including fewer well-child visits, use of supine sleep positions with infants, and increased television viewing among younger children. However, these studies did not directly assess child health and nutrition outcomes so the full loop cannot be established. Similarly, maternal depression appears to reduce the use of authoritative feeding styles with young children but here the evidence is mixed regarding the feeding strategies that are most likely to result in poorer child health. One exception is the research on breastfeeding. The bulk of evidence suggests that maternal depression and anxiety reduce breastfeeding duration among low-income mothers and that reduced breastfeeding leads to child overweight.

The final strategy, coping styles related to the access and availability of foods, is the least studied in this area and, we argue, deserves greater attention. Studies clearly demonstrate that low-income families face significant challenges in attempting to access nutritious food (Darmon

## 34-Maternal Mental Health

et al., 2002; Kaufman & Karpati, 2007) and that successful acquisition of such food appears to require pro-active strategies, such as using coupons and shopping for sales, that require time and planning by parents (Hoisington et al., 2002). Observers suggest that maternal depression will reduce the use of these food-related coping strategies (Wachs, 2008), which may then further exacerbate the negative effects of poverty on child nutrition and health for children of all ages. To date, these hypotheses have not been empirically tested.

### *Research Limitations*

Our review of the literature found many research and methodological limitations that need to be addressed if we wish to fully understand the effect of maternal mental health on child health and nutrition outcomes. First, most indices of maternal psychological distress, food insecurity, and overall child physical health all rely on a common reporter, the mother. This single source may be one reason that psychological distress appears to be more strongly related to both food insecurity and child overall health, as compared to child overweight, anemia, and growth which typically do not rely on maternal self-report but are captured through assessments by independent observers. For example, the primary measure of food security status, the U.S. Food Security Scale Core Module, is not a measure of nutritional status but rather captures the parent's perception of food access (Bickel et al., 2000). Similarly, overall child health is typically assessed by asking the parent to rate child health on a scale from poor to excellent (Larson et al., 2008). Although both measures are frequently used and have been associated with objective indicators of health and nutrition, the experience of psychological distress may cause mothers to hold more negative views of all aspects of their lives, including household food security and child health.

## 35-Maternal Mental Health

Second, the majority of studies use screening devices or checklist inventories to assess levels of depression and anxiety. Fewer studies use clinical interviews, which provide a more accurate identification of these mental health constructs. Moreover, some of the inconsistent results in the literature may be due to these differing conceptualizations and measurement of anxiety and depression. While checklist inventories offer an adequate overview of symptomology and often corresponded to poorer child health, they do not connote true DSM diagnoses. The clinical implications regarding the presence of elevated levels of symptomology versus the presence of a clinical disorder may be very different, with consequences for interventions that seek to improve child health by alleviating maternal mental health disorders.

Third, a major weakness of research in this area stems from the use of cross-sectional designs. Cross-sectional designs are correlational in nature and therefore cannot provide evidence of causal associations. Cross sectional designs, even with more advanced analytic procedures, only substantiate one explanation of the association among the variables at hand. The field needs to develop more longitudinal studies that can infer causality. Such data also allows the use of advanced statistical techniques such as multi-level modeling (MLM) and structural equation modeling (SEM) that can produce better estimates of the relation among variables by testing them simultaneously, in addition to testing the possibility that other models, using the variables in a different order, fit the data equally well.

### Future Directions

The first future direction is to expand research examining the relationship between maternal anxiety and child health and nutrition, and to explore how that connection may differ from the relationship between maternal depression and child health. Given that maternal anxiety and maternal depression are highly co-morbid, the relative scarcity of empirical investigations

## 36-Maternal Mental Health

assessing the effects of maternal anxiety on health-related parenting practices, and on child health and nutritional risk, makes this a critical avenue for investigation. Further, we believe that future studies should include separate measures of both constructs to determine whether maternal anxiety, often linked to over-controlling behavior (Farrow & Blissett, 2005), and maternal depression, which has been associated with withdrawal or disengaged parenting (Goodman & Gotlib, 1999), lead to different health and nutrition outcomes for children. Moreover, it is likely that these mental health constructs interact in ways that increase the risk of poor child health and such knowledge is needed to guide the construction of effective interventions.

Second, the field needs to better explore the “black box” of parenting behaviors that appear to influence child nutritional health in low-income populations. Many of the parent feeding strategies that receive the bulk of attention neglect to consider a key component influencing a child’s nutrition: the quantity and quality of food available in the home. For low-income families, parenting strategies used to cope with limited access to nutritious food may be an influential determinant of the nutritional choices facing poor children, yet we know very little about how maternal mental health affects these strategies, or how such strategies influence a child’s nutritional status, food security status, likelihood of obesity, or overall health. If parental capacity to engage in proactive food shopping, planning, and preparation strategies significantly contributes to child health and nutrition outcomes, then interventions geared toward changing parent-child feeding interactions may meet with limited success due to their failure to consider the broader context in which these interactions occur.

Finally, a key future direction needs to be greater investment in longitudinal studies that explicitly assess the full pathway from maternal mental health to child health among poor families. Not only will such designs separate the effects of poverty from the effects of maternal

### 37-Maternal Mental Health

mental health, they will further our understanding of how change in one part of the pathway leads to change in related parts, with implications for interventions. For example, if a reduction in maternal psychological distress leads to greater participation in well-child visits, and subsequent improvements in overall child health, then efforts to enhance child health outcomes should include identification and treatment of maternal mental health issues. Such designs also will promote increased understanding of how these pathways change in response to development by the child and whether specific periods, such as adolescence, will add alternative considerations (e.g., peer pressure around eating, independent access to food) to this model.

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## 58-Maternal Mental Health

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