6. Family Relationships and Physical Health: Biological Processes and Mechanisms

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Family relationships, especially parent-child relationships, provide scaffolding for development across the lifespan. Families can range from supportive and nurturing to cold and neglectful, with potent effects on a developing child's biological functioning and physical health. Growing evidence shows that family relationships early in life can shape health outcomes into adulthood (Miller & Chen, 2010; Repetti, Taylor, & Seeman, 2002; Shonkoff, Boyce, & McEwen, 2009). Parent-child relationships that are enriched with support and nurturance provide a child with helpful coping resources and protect overall health (Meadows, 2010). In contrast, relationships between parents and children marked by frequent conflict and distress can lead to a myriad of problems ranging from emotional instability to behavioral dysregulation and even chronic illness (Davies, Sturge-Apple, Cicchetti, & Cummings, 2008; Taylor, 2010).

Families with frequent conflict (e.g., repeated episodes of anger, aggression, and yelling) and cold and neglectful relationships (e.g., absence of parental emotional support and unavailability) can be especially damaging to a child's physical health (Miller & Chen, 2010; Repetti, et al., 2002). The Risky Families model described by Repetti et al. (2002) proposes that these family characteristics can create vulnerabilities for children that have the potential to disrupt multiple biological systems and put children at risk for future chronic health problems. This model integrates influences from family characteristics and genetic predispositions, as well as environmental factors. As children in risky families grow into adolescence, risky health behaviors (e.g., smoking, poor diet, risky sexual behaviors) and deficiencies in social

competence begin to develop and are then maintained through adulthood resulting in the development of a chronic illness (Larzelere & Jones, 2008; McEwen, 2003).

Family difficulties put children at risk for a variety of health problems. For example, decreased familial support is linked to increased number of infections (Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997; Walker et al., 1999) and more frequent physical complaints (Gottman, Katz, & Hooven, 1996). A major childhood health problem exacerbated by poor family relationships is asthma, with evidence suggesting that early family environments can affect its onset and severity (Kaugars, Klinnert, & Bender, 2004). Influences of family relationships on childhood asthma include parental stress, marital conflict and parent-child conflict (Chen, Bloomberg, Fisher, & Strunk, 2003; Northey, Griffin, & Krainz, 1998; Shalowitz, Berry, Quinn, & Wolf, 2001). Additionally, children in risky families are more likely to have unfavorable lipid profiles and Type 1 diabetes, both of which increase risk for development of coronary artery disease (Dimsdale & Herd, 1982; Tiberg, Hallstrom, & Carlsson, 2010; Weidner, Hutt, Connor, & Mendell, 1992). Furthermore, exposure to family dysfunction as a child puts individuals at risk for a multitude of health problems in adulthood, including heart disease, cancer, lung disease, and liver disease (Felitti et al., 1998).

In this chapter, the potentially damaging and beneficial influences of family relationships will be discussed in terms of their impact on a child's current and future health. Specifically, damaging influences such as inadequate support and high levels of conflict will be considered, as well as beneficial influences such as parental support and warmth. We then focus on possible biological mediators of the effects of family relationships on child health, including the immune system, the hypothalamic pituitary axis (HPA) and the cardiovascular system—all key systems involved in stress response pathways that can have short- and long-term adverse effects on

health. We conclude the chapter with a discussion of emerging intervention research that targets family dysfunction with an eye toward improving child health through the improvement of family relationships. Due to space limitations, there are a number of key characteristics of families with relevance for child health that we cannot review separately in this chapter, including socioeconomic status, genetic predisposition, health behaviors, and mental health issues; however, there will be instances where the influence of socioeconomic status and health behaviors will be highlighted as it impacts support and/or conflict in families. The biological consequences of family environments discussed in this chapter represent plausible pathways through which risky family environments can create risk for physical and mental health disorders across the lifespan. Investigations of the aforementioned characteristics have the potential to further clarify the moderators of the links between risky family relationships and negative health outcomes and have been covered in other more comprehensive reviews (Flinn, 2011; Francis, 2009; Kaslow, Deering, & Racusin, 1994; Reiss et al., 1995).

Damaging Influences of Risky Family Relationships on Health

Deficient Parental Support and Lack of Warmth

There is substantial evidence on the topic of parental involvement and its influence on social and emotional development and physical health (Belsky, Bell, Bradley, Stallard, & Stewart-Brown, 2007; Waylen, Stallard, & Stewart-Brown, 2008). Children who grow up in an unsupportive environment are prone to a variety of negative health outcomes later in life (Shonkoff, et al., 2009). In this section, we first discuss what defines parenting and parental support and then review some of the research that has examined the negative impact of deficient

parental support and lack of warmth across a range of health outcomes beginning in childhood and extending into adulthood.

Parenting styles are defined by the way in which parents communicate and respond to their children (Baumrind, 1991). There are multiple complex factors that influence how a parent acts towards their child including socioeconomic status, cultural beliefs, and even genetic characteristics (Kendler, 1996). While there are four main parenting styles—including authoritarian (demanding obedience), authoritative (use of reasoning), permissive (giving in to child's demands) and uninvolved—many studies operationalize parenting as positive or negative (Jago et al., 2011). Most of the research to date has focused on the negative aspects of parenting, with the paramount features including inadequate support or communication from a parent, which together have been speculated to produce an exaggerated stress response (Meaney, 2001). Negative parenting can represent a variety of styles and actions, ranging from unlawful neglect (representing a small population subset) to unresponsive, where a child's needs for warmth and nurturance are unmet (representing a larger population subset). The bulk of the research on negative parenting characteristics discussed here focuses on the latter.

Parenting styles that are lacking support, warmth, and nurturance are linked to a number of health problems in children. For example, in a lab study of interactions between parents and children, children of parents with negative parenting styles (unstructured, cold, and unresponsive) had higher incidence of parent-reported rates of illness and higher levels of stress hormones (Gottman & Katz, 1989). Other research indicates that children from authoritarian mothers, who had high expectations for self-control and low sensitivity, were more likely to be overweight in the first grade (Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006). Lack of family support is also linked to management of chronic illnesses such as diabetes. In a study of

children undergoing treatment for diabetes, those with less nurturing parents (less emotional support, poorer conflict resolution, and greater parental expression of anger and sadness) had less metabolic control over their diabetes as evidenced from levels of glycosylated hemoglobin (Martin, Miller-Johnson, Kitzmann, & Emery, 1998).

Evidence suggests that the negative health effects of inadequate parental support and lack of family warmth carry over into later childhood. For example, a recent study investigated the long-term effects of suboptimal parenting on the number of mother-reported child health problems. A child's chances of experiencing poor health in late childhood increased with exposure to maternal resentment and hostility as a toddler, with resentment playing a stronger role than hostility (Waylen, Stallard, & Stewart-Brown, 2008). These early effects of parent-child relationships are not limited to questionnaire reports of family functioning. For instance, poor interactive infant behavior at 8 to 11 months of age in videotaped mother-child interactions—defined by short face-to-face interaction and infant fretfulness—predicted chronic and/or recurrent health problems when children were two years of age (Mantymaa et al., 2003). Further, a 10-year longitudinal study of Danish school-aged children indicated that lack of parental care and support predicted a greatly increased risk for obesity in young adulthood (Lissau & Sorensen, 1994). These studies suggest that parent-child difficulties can begin very early in life with deleterious health effects that continue into later childhood and the early adult years. Notably, very few studies have longitudinally examined the long-term effects of family relationships on health into adulthood.

Family Conflict

Family conflict has long been known to cause behavioral maladjustment and emotional dysregulation problems in a developing child; when family conflict is high, children exhibit greater levels of subjective and behavioral distress (Cummings, Schermerhorn, Davies, Goeke-Morey, & Cummings, 2006). A growing body of research suggests that the negative effects of family conflict extend to physical health.

Much like deficient support, the presence of family conflict can affect a growing child as early as infancy and continue through childhood (Luecken & Lemery, 2004). For example, in an at-home observation study of mother-infant interactions, greater conflict in the home was associated with lower infant weight attainment (Stein, Woolley, Cooper, & Fairburn, 1994). In another study of over 6,500 children, observed family conflict was associated with less height attainment at age 7 and into adulthood (Montgomery, Bartley, & Wilkinson, 1997). These studies emphasize the impact of conflict on a child's growth and development. It has also been demonstrated that high-conflict families—in which parents report open expressions of anger and aggression—are associated with higher levels of total cholesterol and high-density lipoprotein in sons between the ages of 8 and 18 (Weidner, et al., 1992). This unfavorable lipid profile may leave children at increased risk for future cardiac illness. While that study did take factors such as personality and family climate into account, it did not address influential health behaviors such as diet and physical activity. As a whole, these studies highlight the impact specific family characteristics have on the immediate health of growing children.

Further research suggests that there are long-term effects of family conflict. For example, in a retrospective study of young adults from intact and divorced families, higher levels of early family conflict in both groups were associated with increased somatic symptoms, illness reports, and health care visits in young adulthood (Luecken & Fabricius, 2002). Additionally, in

a study of late adolescents, early family conflict was linked to an avoidant coping style and low-self-concept, and had a negative impact on later health habits (including short sleeping periods and smoking; (Michael, Torres, & Seemann, 2007)). It is important to note that family conflict here was not directly linked to health but rather impacted the development of poor health behaviors and coping strategies. In a demonstration of the prospective effects of family conflict on major health problems, men who described tumultuous relationships with either their mother or father were more likely to be diagnosed with a serious medical condition 35 years later, including asthma, arthritis, heart problems, and depression (Stewart-Brown, Fletcher, & Wadsworth, 2005). This research highlights the extensive negative impact that family conflict has on a wide-range of health outcomes across human development.

Beneficial Influences of Family Relationships on Health

Parental Support

While deficient support and the presence of conflict can negatively affect health, supportive and warm parenting conversely appears to reduce stress and promote better health outcomes. Both parental warmth and sensitivity are associated with a cooperative relationship between parent and child (Campbell, 2002), and the presence of warmth and sensitivity by a parent is correlated with a child's ability to regulate negative emotions (Denham & Kochanoff, 2002). From an extensive review of marital conflict and child adjustment, it was concluded that supportive parent-child relationships not only promote a child's well being but also buffer children from the effects of marital conflict (Grych & Fincham, 1990).

Multiple studies have investigated the mechanisms through which high-quality family relationships are beneficial. Family support positively influences adaptive coping styles and the

effectiveness of coping responses to stressful events (Valentiner, Holahan, & Moos, 1994). Positive family relationships can also help prevent the emergence of negative health behaviors. For instance, in a national school survey of children from grades 7 through 11, parent-child connectedness was demonstrated to be protective against cigarette and alcohol use while controlling for family structure and poverty status (Resnick, 1997). Additionally, family connectedness and meal time frequency are associated with a reduction in tobacco and alcohol consumption in adolescent girls (White & Halliwell, 2011). Further, children from families with high-quality relationships report consistently better overall health and less destructive health behaviors (including smoking, alcohol use, and illegal substance use) compared to children from families of low-quality relationships when using family income and parental education as covariates (Hair et al., 2009). While providing insightful information about positive family influences, this study also clarified the mechanisms linking family relationships and poor health outcomes by showing that unfavorable health outcomes in families were associated with lower family income and lower parental education. Long-term benefits of positive family relationships also have been reported; a 35-year prospective study indicated that college students who rated their parents high in parental caring had a lower risk of being diagnosed with a chronic disease (including cardiovascular disease, duodenal ulcers, and alcoholism) in midlife compared to those who rated their parents low in parental care (Russek & Schwartz, 1997). In short, the research to-date provides evidence that family support and warmth may have the ability to buffer the effects of stress and positively influence long-term health outcomes and health behaviors. Later we discuss possible intervention opportunities for increasing warmth and support in families.

Biological Mediators

With robust evidence indicating strong links between family relationships and health,

researchers recently have begun to examine how family relationships "get under the skin" to affect health in childhood and beyond. Despite ample evidence that growing up in a risky family environment is associated with more physical health problems later in life, little is known about the biological and behavioral pathways through which risky family environments exert their deleterious effects on health. For the remainder of this chapter, we discuss the growing body of research that is attempting to elucidate three biological pathways involved in the stress-response pathways with links to family relationships and health—immunity, HPA reactivity, and cardiovascular reactivity.

Immunity

The immune system is affected by challenges in the environment (i.e., stress; (Segerstrom & Miller, 2004)), and extensive research shows that chronic stress can suppress the immune system's protective abilities (Cohen, Miller, & Rabin, 2001; Herbert & Cohen, 1993; Kiecolt-Glaser, Glaser, Gravenstein, Malarkey, & Sheridan, 1996). In recent years, there has been increasing interest in the immune system as a key pathway through which family relationships affect child health, with particular emphasis on studies of children with chronic inflammatory diseases such as asthma that are both immune-regulated and have known links to psychological stress.

Deficient Parental Support. Studies of children with asthma indicate that lack of quality family relationships and presence of family difficulties impact both symptom expression and onset of asthma attacks (Chen, Chim, Strunk, & Miller, 2007; Sandberg et al., 2000). Research has demonstrated, for example, that children with asthma who have a strained parent-child relationships produce immune cells that are more resistant to the anti-inflammatory effects of

hydrocortisone (a main ingredient in rescue inhalers) in controlling production of interleukin-5 and interferon-gamma, which are key proteins that regulate airway inflammation (Miller, Gaudin, Zysk, & Chen, 2009). Children with asthma and low levels of family support also have poorer pulmonary function and more nighttime asthma symptoms during a two-week period (Chen, et al., 2007). These findings represent emerging evidence for the direct effects of family relationships on the immune system, with poor parent-child relationships potentially exacerbating different inflammatory processes that contribute to asthma pathogenesis (Reading, 2007; Wright, 2007).

Familial Conflict. Research suggests that family conflict is linked to immune dysregulation as well. For example, adolescent girls raised in families with moderate amounts of conflict had increased interleukin-6 production over an 18-month follow-up period (Miller & Chen, 2010) and exhibited greater glucocorticoid resistance in immune cells, which can lead to increased airway inflammation (Lee, Brattsand, & Leung, 1996). Additionally, in a study comparing children with asthma and medically healthy children, children with asthma who had high levels of chronic family stress had increased production of interluekin-4 and 5 as well as elevated interferon-gamma when they had experienced an acutely stressful event (Marin, Chen, Munch, & Miller, 2009); children with asthma who had lower levels of chronic family stress and medically healthy children did not exhibit these stress-related changes. Importantly, this study suggests that children who experience both acute stress and constant family stress are at increased risk for greater asthma-related immune dysfunction.

HPA Axis Reactivity

The biological system that has perhaps received the most interest as a possible mechanism of the links between family relationships and health is the Hypothalamic-Pituitary-Adrenal (HPA) axis, one of the body's regulatory systems that helps individuals adapt to the demands of their environment to maintain and regulate the body's homeostasis (Kudielka & Kirschbaum, 2005). The HPA axis produces cortisol, the chief stress hormone in humans. Cortisol levels are particularly sensitive to social stressors like those from family relationships (e.g., Lam & Dickerson, present volume). Although links between stress and the HPA axis are complex, chronic stress typically is associated with greater cortisol production and a high, flat diurnal cortisol profile (Miller, Chen, & Zhou, 2007), while acute stressors are associated with transient cortisol increases (Dickerson & Kemeny, 2004). The HPA axis appears to have key relevance for health, as its dysregulation has been associated with a variety of physical and psychiatric disorders ranging from metabolic syndrome and fibromyalgia to depression and post-traumatic stress disorder (Entringer, Kumsta, Hellhammer, Wadhwa, & Wust, 2009; Holsboer, 2000; Yehunda, 1997) and even mortality (Kumari, Shipley, Stafford, & Kivimaki, 2011; Sephton, Sapolsky, Kraemer, & Spiegel, 2000). Evidence suggests that early environmental influences from family relationships can impact future HPA functioning. In this section, research will be highlighted that discusses deficient parental support and familial conflict in terms of its effects on the HPA Axis.

Deficient Parental Support. Children with less responsive parents and less secure attachments produce higher cortisol levels when faced with acute stressors (Gunnar & Donzella, 2002). Further, parental warmth moderates the effect of stress on cortisol output such that the less parental warmth children received in childhood, the more cortisol they secreted on days they experienced severe stress as a young adults (Hanson & Chen, 2010). Indeed, recent empirical

evidence suggests that moderate to high levels parental warmth early in life may have the ability to buffer the biological effects of stress beyond the childhood years or perhaps that a certain threshold value of parental support can provide regulatory effects on key biological pathways (Evans, Kim, Ting, Tesher, & Shannis, 2007; Hanson & Chen, 2010). In addition to parental support, the quality of parents' marital relationships may affect children's HPA axis functioning. Evidence for this comes from a recent study showing that poor marital functioning is associated with higher average and wake-up cortisol levels in both adolescent and kindergarten-aged children (Pendry & Adam, 2007).

Additional family research has revealed a relationship between cortisol levels and family characteristics—such as childcare use and moderate amounts of family expressiveness—that may potentially serve as protective factors. In one study, the use of childcare was a protective factor against the effects of deficient parental support on daily cortisol production for children with mothers who had low job role quality and frequently experienced emotional exhaustion (Chryssanthopoulou, Turner-Cobb, Lucas, & Jessop, 2005). Specifically, children in families with average amounts of expressiveness—defined by the number of opportunities and amount of encouragement to express feelings and opinions—had lower cortisol levels in both the morning and evening compared to children in highly expressive or reserved families. Further, elevated cortisol levels were found in children with mothers reporting high levels of emotional exhaustion and low job quality. This multifaceted study provides insight on the complex relationships between health and families, in that high and low levels of family expressiveness can cause stressful family environments that may put a child at risk for future physical health problems; in contrast, moderate amounts of expressiveness may allow for a more stable and less stressful family environment to help safeguard children from the development of future health problems.

Familial Conflict. A handful of studies have focused specifically on family conflict and alterations of the HPA Axis. For instance, in a study of 178 families and their kindergarten children, interparental conflict was associated with lower levels of cortisol reactivity in children to a simulated phone argument between their parents (Davies, Sturge-Apple, Cicchetti, & Cummings, 2007); diminished cortisol reactivity to the simulated phone argument predicted child-externalizing symptoms as reported by their parents. Some of our own work has investigated everyday family conflict in preschoolers' home environments and diurnal cortisol patterns using an innovative ambulatory assessment device called an Electronically Activated Recorder (EAR; Mehl, Pennebaker, Crow, Dabbs, & Price, 2001). The EAR is a digital audio recorder that allows researchers to "hear" what family members are saying to each other, providing an acoustic log of the participants' days as they unfold. We have found, for example, that EAR-assessed daily conflict in the home—above and beyond parents' daily reports of conflict at home—is associated with lower cortisol at wake up and flatter cortisol slopes in young children (Slatcher & Robles, in press) This work represents an important advance in generating an ecologically valid understanding of the links between everyday behaviors and health-related biological processes in young children. Our findings indicate that preschoolers' everyday conflicts at home are predictive of less "healthy" diurnal cortisol rhythms, extending previous research demonstrating links between questionnaire reports of family relationship quality and child cortisol (Pendry & Adam, 2007). However, this study is the first to our knowledge to show that young children's diurnal cortisol patterns are linked to discrete social behaviors in everyday life at home, providing a more nuanced understanding the links between family environments and stress biology.

Additional work has been conducted on the long-term effects of early family stress on HPA axis functioning in young adults. For example, one study investigated the prospective effects of early parental divorce or separation before age 10 on HPA activity in young adults (age 20-25), finding that divorce was associated with an alteration in HPA axis activity through increased ACTH levels—an important hormone in the HPA axis released when under stress—and decreased cortisol release in the lab (Bloch, Peleg, Koren, Aner, & Klein, 2007). This work suggests that not only do the presence of conflict and absence of family support have negative long-term health consequences, but that parents' marital dissolution can impact biomarkers of physical health as well.

Cardiovascular Reactivity

Psychosocial factors, such as conflict and aggression, can affect the cardiovascular system by delaying its recovery from acute stressors, as evidenced by sustained cardiovascular activation above baseline levels (Chida & Steptoe, 2010; Steptoe, 2007). Cardiovascular reactivity to stress is measured in a variety of ways through changes in blood pressure and heart rate, but also through changes in respiratory sinus arrhythmia, which reflects the influence of the parasympathetic nervous system on cardiovascular activity. When these different components of the cardiovascular system are under chronic stress, wear and tear from repeated surges in blood pressure and frequent increases in heart rate on the blood vessels and vasculature can build up and eventually lead to chronic diseases such as hypertension or cardiovascular disease (Pieper & Brosschot, 2005). In this section we describe research suggesting that negative family relationships can adversely affect the cardiovascular system.

Deficient Parental Support. There is growing evidence that deficient parental support can detrimentally impact cardiovascular physiology. Parent-child relationships with lower levels of parental support (Woodall & Matthews, 1989) and harsh parenting styles (Gump, Matthews, & Raikkonen, 1999) elicit greater systolic and diastolic blood pressure reactivity to stressors. In a 4-year prospective study, children exposed to accumulated psychosocial and physical risk factors (e.g., poor housing quality, child-family separation) had increased "wear and tear" on multiple physiological systems—including the cardiovascular system (measured by blood pressure reactivity to an acute lab stressor)—but *only* when mothers were low in responsiveness (Evans, et al., 2007); those children at high risk also had delayed blood pressure recovery during a mental arithmetic task. In terms of longitudinal effects of parental support on the cardiovascular system, more supportive and less negative parenting before kindergarten is associated with better cardiovascular functioning in elementary school—including lower heart rate and blood pressure—especially with the presence of a positive father-son relationship (Bell & Belsky, 2007). This research demonstrates that even a small amount of support early in life is beneficial to child health.

While blood pressure provides a wealth of knowledge about the cardiovascular system's response to stress, another important aspect of the cardiovascular system with relevance for health is respiratory sinus arrhythmia (RSA). RSA can be assessed in the resting, baseline state—which some view as an indicator of vagal tone—and in response to challenge. Higher RSA has been associated with more flexible coping responses and greater self-regulation when individuals are confronted with a stressor (Calkins, 1994; Gentzler, Santucci, Kovacs, & Fox, 2009). One study showed that children who received parental support during a challenge task displayed a greater increase in RSA, indicating a healthier response (Calkins & Keane, 2004).

Another study demonstrated that children with poor quality relationships—measured via observation of mothers and children across several laboratory interactions—have less vagal tone (lower resting RSA) and less heart rate acceleration across a variety of stress-inducing tasks, suggesting a less flexible cardiovascular response (Calkins, Graziano, Berdan, Keane, & Degnan, 2008). Several studies suggest that alterations in RSA are associated with increased risk for cardiovascular disease and even mortality (Gorman & Sloan, 2000; Heponiemi et al., 2007). Taken together, if parental support is associated with lower RSA, this has significant implications for health and well-being. The intricacies of the relationships between parental support, self-regulatory skills, and RSA remain unclear. The contributions from these studies show that parental support may contribute to both the acquisition of self-regulatory skills and higher RSA, to each variable separately, or to a third process that affects both variables.

Familial Conflict. There are various mechanisms through which family conflict may be related to cardiovascular outcomes; here we focus specifically on RSA. Parental conflict is known to affect a children's RSA as early as infancy. A recent study showed that 6-month old infants from families with higher levels of parental conflict showed smaller change in RSA when interacting with mothers, indicating a poorer RSA response (Moore, 2010). RSA has also been shown to mitigate the negative health effects of parental conflict. In boys aged 8 to 12, both a higher resting RSA and larger change in RSA during a challenge task protected them against increased respiratory and digestive health problems related to the exposure to frequent marital and verbal conflict in their family (El-Sheikh, Harger, & Whitson, 2001). These studies indicate that alterations in RSA as a function of family conflict may be part of a multiple (and bidirectional) pathways through which negative family relationships can lead to greater wear and tear on the cardiovascular system and increased risk for future cardiovascular problems.

Interventions

Considering the deleterious effects that risky family environments can have on health, researchers are now beginning to design and test family interventions tailored to improving specific aspects of family relationships. These interventions are targeted to helping parents learn behaviors that shape effective behavioral skills in children, which, ultimately, may bring about improvements in the short-term and long-term prospects of child health and continuing into later development. In the literature, there has been extensive intervention work with families of children with Type 1 diabetes. Families including a child with diabetes provide a good framework for testing family interventions, as adolescents with poorly controlled diabetes are more likely to be of lower socioeconomic status, come from a single-parent family, and have low levels of parental support (Delameter et al., 1999; Liss et al., 1998; Palta et al., 1997).

Multisystemic interventions incorporate intensive home- and community-based family therapies, and show particular promise for improving child health. Multisystemic therapy (MST) is an individualized treatment model where families set goals for a child's treatment and collaborate with a mental health professional to design and implement an action-oriented and focused treatment plan (Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 1998). This involves conducting assessments in the home, school, and community focusing on gathering information from the youth, parent, siblings, peers, and teachers. In MST, a mental health professional's goal is to help a family identify their problems and prioritize changes that are most likely to lead to their desired outcomes. In recent research testing the efficacy of MST for diabetes, there was improvement in adolescents' metabolic control, reduction in non-adherence to treatment plans, and decreases of inpatient admissions over a 6-month period (Ellis et al., 2005; Naar-King et al., 2009). The multisystems approach has also been effectively used to treat

obesity in African-American adolescents: those receiving MST showed significantly reduced body fat and weight, while those in a traditional weight-loss program did not (Naar-King, et al., 2009). These preliminary studies suggest that an intensive multisystems approach may be effective in curtailing some of the vulnerabilities and deficits associated with risky family environments.

Conclusion

Being in a family that is deficient in parental support, lacking warmth, and marked by frequent conflict puts a child at risk for both short-term and long-term health problems. Risky families have a detrimental impact on multiple biological systems, lessening the body's ability to protect itself against common illnesses and regulate its response to stress. The research to-date on the links between family relationships and health calls for an integration of biological, emotional, cognitive, and behavioral outcomes into cohesive models that can help to explain the interplay between genes, environments and their interactive effects on health. Still needed are studies identifying the critical developmental periods (e.g., preschool, school-age, adolescence) through which children are at risk for health problems and physiological dysfunction that may last into adulthood.

The evidence reviewed here suggests that negative family relationships can have lasting effects on child health, indicating a need for increased early family intervention research. Interventions focused on reducing family conflict and anger while also increasing warmth and cohesion are likely to be particularly effective. Parents in risky families, especially those in low SES environments, could potentially benefit from learning effective behavior and self-regulatory skills to foster more positive relationships with their children; early family interventions, in turn, may lead to improvements in child health (Naar-King, et al., 2009). Troubled family

environments cast a long shadow on physical health. Facilitating positive, warm interactions between parents and children through psychosocial interventions has the potential to shorten that shadow.

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