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Who Done It? Rurality vs. SES as Critical Factors in Evaluating the Prevalence of Child Psychosocial Concerns in Primary Care

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ABSTRACT

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The purpose of this study was to evaluate the prevalence of child psychosocial concerns in rural primary care, hypothesized to be greater than national averages due to lacking mental health services in rural areas. This study was an examination of the role of SES, various definitions of "rural," and the interaction of SES and rurality, in predicting parent-reported child psychosocial concerns in Appalachian primary care clinics. Caregivers presenting with their child at one of 8 pediatric primary care sites (n=2,672) were recruited to complete a measure assessing demographics and the Pediatric Symptom Checklist (PSC). Results showed that while rural status was not associated with PSC scores, higher parental education was associated with lower rates of clinically significant psychosocial concerns. The present study failed to replicate prior preliminary findings that child psychosocial concerns are more prevalent in rural primary care. SES, rather than rurality, appeared to be the primary predictor of such concerns.

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CHAPTER 1

INTRODUCTION

Children and adolescents exhibit psychosocial concerns at higher rates than any other chronic condition (Jellinek et al., 1999). By age 18 nearly half of American youth have met criteria for at least one DSM-IV disorder (Merikangas et al., 2010). In particular, externalizing disorders have been found to show high stability over many years, with earlier diagnosis leading to worse outcomes during adolescence and adulthood (Coie & Dodge, 1998). The prevalence and stability of these concerns make them an important issue for researchers to consider (Campbell, 1995).

The presentation of psychosocial concerns is an increasing focus in primary care (Kelleher, McInerny, Gardner, & Childs, 2000) with studies showing that 10%-20% of children presenting in this setting have a significant concern (Jellinek et al., 1999; McInerny, Szilagyi, Childs, Wasserman, & Kelleher, 2000; Williams, Klinepeter, Palmes, Pulley, & Foy, 2004). There is some evidence that such concerns may be more common in rural primary care settings (Cooper, Valleley, Polaha, Begeny, & Evans, 2006; Polaha, Dalton, & Allen, 2011), perhaps due to a lack of access to specialty mental health care and/or health disparities in rural areas (Barker, Gerzoff, Crespo, & Shrewsberry, 2011; Centers for Disease Control, 2009; Crooks, 2000; Halverson, 2004; Lenardson, Ziller, Lambert, Race, & Yousefian, 2010).

If indeed psychosocial concerns are presenting at a higher rate in rural primary care, there are critical implications for practice; however, research to date has not addressed two important methodological considerations. First, there is evidence that children with low socioeconomic status (SES) are more likely than those with high SES to have behavior problems (Qi & Kaiser, 2003); however, SES was not fully considered in prior studies of rural pediatric primary care. Second, numerous definitions of "rural" from government agencies as well as academic

researchers make comparisons between studies difficult. In sum, the relationships between SES, rurality, and childhood psychosocial concerns are complex. More research is needed to examine how SES and rurality might interact to influence prevalence rates of childhood psychosocial concerns. In order to address these issues, the purposes of this study are:

1. To document the prevalence of childhood psychosocial concerns in pediatric primary care using a large representative sample from rural, southern Appalachia.
2. To examine various measures of rurality and how they explain the variance in psychosocial screening scores;
3. To determine if the relationship between rurality and child psychosocial concerns might depend on the level of SES.

The following introduction reviews the literature pertinent to these purposes including an overview of the current research on the definition, stability, etiology, and treatment of childhood psychosocial concerns. In addition, prevalence rates of these concerns are discussed, with a particular emphasis on rates in primary care. Next, mental health disparities and the barriers that contribute to these disparities are considered. The literature on SES is then overviewed, with emphasis on the connection between SES and psychosocial concerns. Finally, several definitions of "rural" are examined in the context of childhood psychosocial concerns.

Childhood Psychosocial Problems

Defining Psychosocial Concerns

Nearly all parents worry about their child's behavior or emotions at some point during their child's development. These concerns are ubiquitous, with each childhood developmental stage bringing new parental concerns. For example, tantrums during the toddler years and trouble sharing during preschool years are developmentally typical struggles parents must

navigate (Campbell, 1995). Some parents, however, are faced with children whose psychosocial problems escalate beyond what is normative, impairing the child's day-to-day functioning. According to the National Comorbidity Study, 46.3% of youth 13 to 18 have previously had or currently have a diagnosable DSM-IV disorder, with 21.4% of cases being classified as serious (Merikangas et al., 2010). Clinicians and researchers broadly categorize these psychosocial problems as either externalizing or internalizing disorders. Hinshaw (1992) explains that externalizing problems stem from deregulated behavior in the form of, "defiance, impulsivity, disruptiveness, aggression, antisocial features and overactivity" (p.127). DSM-IV diagnosis of Oppositional Defiant Disorder and Conduct Disorder fit into this category, as does Attention Deficit Hyperactivity Disorder. Problems with emotion or mood typify internalizing disorders, which have features of anxiety, depression, and withdrawal (Kovacs & Devlin, 1998).

The Stability of Childhood Psychosocial Concerns

The stability of psychosocial concerns has primarily been studied via longitudinal analysis using correlation coefficients to compare behavior that occurs at one time with the same behavior at another (Anderson & Werry, 1994; Coie & Dodge, 1998; Olweus, 1979; Zumkley, 1994). Aggression is a key feature of externalizing disorders that has been the target of careful study. Psychological research over the last 30 years has consistently shown that individual differences in aggression are highly stable over time, especially when aggressive behaviors begin at a young age (Coie & Dodge, 1998).

Several reviews and meta-analyses have provided evidence for the stability of externalizing behaviors in children and adolescents (Anderson & Werry, 1994; Coie & Dodge, 1998; Huesmann, Eron, Klein, Brice, & Fischer, 1984; Olweus, 1979; Zumkley, 1994). After reviewing 16 longitudinal studies, Olweus found that individual differences in aggression over

time were nearly as stable as intelligence (Olweus, 1979). These individual differences appeared as early as 3 years old. Olweus found that while children differ on the extent to which they display the trait of aggression, they tend to maintain their positions relative to other children across many years. Across the reviewed studies, aggression was initially measured between age 6 months to 21 years. At a 5-year follow up, on average, Olweus found stability coefficients for aggression that were only slightly larger (r=.69) than at a 10-year follow up (r=.60) (Olweus, 1979). Olweus's main finding, that individual differences in aggression are stable over time, has been supported by a more recent meta-analysis by Zumkley (1994), which analyzed 10 studies of male aggression and found that initial aggression levels were highly correlated with follow-up aggression levels (r=.61).

In addition to findings regarding aggression, reviews of the literature by McLoyd (1998) and Qi and Kaiser (2003) also show that significant behavioral and emotional problems, more broadly defined, can be present in very young children and remain stable over many years, often leading to problems with academic, social, and personal development for the child. In their review of the literature, Coie and Dodge (1998) point out that, "Studies of early child behavior problems show convincing evidence of continuity between disobedience and defiance of adults, aggression toward peers, impulsivity and hyperactivity at age 3, and similar or more serious behavior problems later in childhood" (p. 802). While not all children with antisocial behavior in childhood go on to continue that behavior into adulthood, nearly all antisocial adults show a pattern of antisocial behavior that began in childhood (Coie & Dodge, 1998).

Two studies illustrate the course of early onset externalizing behavior. In a longitudinal study Campbell and Ewing (1990) followed 29 preschoolers with high levels of behavior problems, from age 3 to age 9. Two thirds of these children who still had significant

externalizing behavior problems by age 6 had a diagnosable externalizing disorder by age 9. Additionally, Rose, Rose, and Feldman (1989) measured the behavior of 44 children ages 2 to 5 who were considered low SES, using the Child Behavior Checklist. The study found that over a 3-year period, the level of externalizing behaviors in children remained relatively stable. Children who had high levels of externalizing behavior at 2 years old had similar behaviors at 5 years old.

There has been little research directly comparing the stability of externalizing and internalizing disorders. In a review of the literature, Anderson and Werry (1994) determined that internalizing disorders show lower stability than externalizing disorders, although not all studies support this conclusion (Verhulst & Van der Ende, 1992). Two studies illustrate the development and maintenance of internalizing disorders in children and adolescents. Bosquet and Egeland (2006) followed 155 children from the Minnesota Longitudinal Study of Parents and Children from infancy until age 17.5. Results indicated that anxiety symptoms were moderately stable during childhood and adolescence. The ability of preschoolers to regulate their emotions was negatively correlated (r=-.25) with childhood anxiety. Additionally, childhood anxiety was positively correlated (r=.11) with preadolescent anxiety, which was positively correlated (r=.32) with anxiety at 16 years old.

Bongers, Koot, van der Ende, and Verhulst (2003) followed 2,076 children, ages 4 to 16, and measured their parent reported behavioral and emotional problems using the Child Behavior Checklist. Data were collected five times at 2-year intervals, with 1,149 children participating in each and every data collection. The study found that anxious and depressed symptoms as well as other internalizing problems followed an increasing curvilinear developmental trajectory as age increased, meaning that these problems were moderately stable during childhood and

adolescence. The literature on the stability of both internalizing and externalizing disorders during childhood and adolescence raises the question of how these disorders develop.

The Etiology of Childhood Psychosocial Concerns

Several factors have been linked to the development and maintenance of childhood psychosocial problems, including characteristics specific to the child and parent, as well as sociodemographic risk factors (Qi & Kaiser, 2003). While a complete review of these factors is beyond the scope of this paper, several pertinent studies are highlighted.

Child effects. There is a significant amount of research showing that certain child factors, such as attachment status, temperament, cognitive ability, language skill, social skill, and gender are related to psychosocial concerns (Qi & Kaiser, 2003). As an example, difficult temperament in childhood has been linked to both internalizing (Marakovitz, Wagmiller, Mian, Briggs-Gowan, & Carter, 2011) and externalizing behaviors (Honomichl & Brent, 2012) later in life. According to van Aken, Junger, Verhoeven, van Aken, and Dekovic (2007), temperamental characteristics are generally defined as, "moderately stable, constitutional traits determining the way children interact with their environments" (p. 553). In one longitudinal study Keenan, Shaw, Delliquadri, Giovannelli, and Walsh (1998) followed 104 low-income families and their 1- to 3-year old children. The study found that difficult temperaments primarily led to internalizing disorders (Keenan et al., 1998). The authors argue that continuity exists between early difficult temperaments in children and later psychosocial problems.

Parent effects. Apart from characteristics specific to the child, recent research has shown that parental factors, such as parenting style and attachment also play a role in the development of child behavior problems and may also interact with child factors. For example, family and parenting factors may moderate the relationship between difficult temperament and

the expression of behavioral and emotional problems. In a longitudinal survey study with 1,202 mothers, inhibited temperament was associated with the development of internalizing symptoms in 2 and 3 year old children; however, the degree that families expressed their emotions towards each other moderated the relationship. Less emotional expression was associated with greater internalizing symptoms in children with inhibited temperament. Additionally, higher rates of maternal internalizing symptoms were associated with higher rates of the same symptoms in children (Marakovitz et al., 2011).

Parental factors such as high levels of negative control and lack of maternal sensitivity (van Aken et al., 2007) as well as negative discipline (e.g. coercive, inconsistent, physical) (van Zeijl et al., 2007) have been shown to increase the likelihood of behavior problems in children. These factors are associated with more externalizing symptoms in children who had difficult temperaments than for those whose temperaments were classified as "easy." Interestingly, van Zeil et al. (2007) found that children with difficult temperaments are more susceptible to both "positive" (redirecting, explaining, attempts at understanding child's perspective) and "negative" (inconsistent, physical) discipline. When positive discipline was used, children with difficult temperaments had less externalizing problems and aggression than children with easy temperaments during a 10-minute scenario where researchers coded parent-child interactions. In sum, there is not a direct path from difficult temperament to the development of psychosocial problems, but parental influences appear to play a significant role.

Attachment style is another factor that can influence children's behavior. Attachment theory developed out of the work of John Bolby and Mary Ainsworth and refers to the way that children form bonds with, or become attached to, their parents early in life (Bretherton, 1992). While temperament is considered to be innate, parenting practices (such as warmth and

sensitivity) can significantly influence the development of a child's attachment style to the extent that attachment can develop independently of temperament (Kaiser & Rasminksy, 2008). Several studies (Bohlin, Eninger, Brocki, & Thorell, 2012; Fearon, Bakermans-Kranenburg, Lapsley, van Ijzendoorn, & Roisman, 2010; Fearson & Belsky, 2011; Pace & Zappulla, 2011; Roskam, Meunier, & Stievenart, 2011; Shaw, Owens, Vondra, & Keenan, 1996) have shown that disorganized or insecure attachment is a predictor of externalizing behavior. A recent meta-analytic study of 69 empirical papers on this topic found that children with insecure attachment exhibited more externalizing behaviors than children with secure attachment, with an effect size of d=0.31. Additionally, children with disorganized attachment also had elevated levels of externalizing behavior compared to children with secure attachment, with an effect size of d=0.34. The effects were stronger for boys than for girls (Fearon et al., 2010).

Contextual Factors. Recent research has focused on explaining psychosocial concerns in terms of a combination of several factors including temperament, attachment, parenting behavior (Roskam et al., 2011), and family risk factors (Fearson & Belsky, 2011). The most sophisticated models of the development of child behavior problems take into account the bidirectional nature of the interaction between the child and his or her environment. For example, Bronfenbrenner's ecological model conceptualizes the development of child behavior problems as being dependent on several progressively broader levels of influence in the child's environment (Bronfenbrenner, 1994). These levels of influence include microsystems, mesosystmes, exosystmes, and macrosystems. On the most central level, characteristics specific to the child and parent interactions with the child play an important role in development. For example, lack of parental sensitivity and harsh discipline may influence the development of behavior problems on a microsystems level. However, in the ecological model, these

characteristics are considered as they occur within a broader context. For example, on a macrosystems level, the SES of a family may indirectly influence the development of child psychosocial problems by influencing a variety of factors such as stress levels and parenting style. Additionally, living in an area where there are substantial barriers to healthcare access (e.g., many rural areas) may mean that children with behavior problems may go untreated. Contextual factors including SES and rurality are the focus of this study.

Treatment of Childhood Psychosocial Concerns

Evidence-based treatments for both internalizing and externalizing disorders in children include variations of behavioral and cognitive behavioral interventions (Ollendick & King, 2004). These interventions may be carried out during individual or family psychotherapy sessions at specialty mental health clinics, as a part of a community based intensive case management program, or during brief sessions in primary care led by a behavioral health consultant (BHC) (Farmer, Compton, Burns, & Robertson, 2002; Valleley et al., 2007). In their review of the literature, Eyberg, Nelson, and Boggs (2008) located 16 evidence-based treatments for disruptive behaviors in children and adolescents. Examples include variants of behavioral parent training, Multisystemic Therapy (MST), and Anger Control Training (just to name a few). These treatments have strong empirical support (Pelham & Fabiano, 2008) that is critical given the prevalence of psychosocial concerns in children.

Evidence-based interventions for childhood psychosocial concerns have several fundamental similarities in both therapeutic content and technique. Recently, some researchers in the field have shifted their focus from evaluating individual treatment approaches to uncovering "common elements" among a list of treatments that already have a substantial evidence base (Garland, Hawley, Brookman-Frazee, & Hurlburt, 2008). Garland et al. (2008)

compared eight evidence-based treatments for disruptive behavior problems and found a long list of core elements that applied both to interventions that were parent-focused, as well as those that emphasized youth skills training. For example, the content of most interventions included an emphasis on problem solving skills, anger management, and limit-setting. The typical pattern across all reviewed treaments was a minimum of 12 weekly 1-hour sessions in which both the parent and child were present. Specific techniques that were common among interventions included "psychoeducation," "use of homework", "role playing," "modeling," "giving parents educational materials," and "reviewing goals" (Garland et al., 2008).

Integrated Primary Care

Primary care may be an opportune place to target and treat children's psychosocial concerns because 10%-25% of children in primary care have such concerns, making these concerns the most common chronic condition in pediatric visits (Borowsky, Mozayeny, & Ireland, 2003; Cooper et al., 2006; Jellinek et al., 1999; Kelleher et al., 2000). Nationally, primary care providers (PCPs) are increasingly addressing childhood psychosocial problems in both rural and urban areas. A study in 2000 found that the identification of childhood psychosocial problems by physicians rose from 6.8% in 1979 to 18.7% in 1996 (Kelleher et al., 2000).

When children's psychosocial concerns are discussed with a physician in primary care, the length of the appointment increases significantly (Cooper et al., 2006). This poses a problem, especially in rural areas where there are fewer primary care providers (PCPs) per person compared to urban areas (South Carolina Rural Health Research Center, 2008). Physicians are faced with the choice of working longer hours each day to see the same number of patients or seeing fewer patients. Integration of mental health professionals, such as clinical

psychologists, into primary care has been proposed as a solution to this problem (Jameson & Blank, 2007). In this model PCPs have the opportunity to refer children with psychosocial concerns directly to a psychologist, thus freeing up more time to see additional patients.

An integrated model could address extant barriers to health care that rural residents face including access and logistical issues. For example, an integrated care site would provide a centralized location where a child could go to receive both physical and mental healthcare, thereby reducing transportation barriers (Strosahl, 2005). Rural residents who feel stigmatized by seeking mental health services via traditional routes may feel more comfortable seeking help through the primary care format (Jameson & Blank, 2007) because it provides more anonymity and is a common route of healthcare delivery. Additionally, integrated care can help address psychological components of chronic disease, aid in prevention efforts, reduce empty referrals to traditional mental health, and help in the early detection of mental illness (Byrd, O'Donohue, Cummings, & Henderson, 2005) because mental health professionals are working alongside physicians.

Given the fast pace of primary care, many existing evidence based treatments are not feasible to implement in this setting. However, psychologists and other mental health professionals working in primary care can use brief interventions to treat children's psychosocial concerns on a population-based level. Often, these interventions include components of cognitive behavioral therapy, acceptance and commitment therapy, or motivational interviewing. The use of some brief interventions in pediatric primary care, especially ones that are behaviorally focused, have been shown to be efficacious (Bower, Garralda, Kramer, Harrington, & Sibbald, 2001; Erickson, Gerstle, & Feldstein, 2005; Stein, Aitner, & Jensen, 2006), although more research is needed in this area.

Now that the etiology and treatment of childhood psychosocial concerns have been discussed, it is important to explore how prevalent these problems are both in national samples and in rural primary care. By understanding which settings and geographical areas have the highest prevalence rates of childhood psychosocial concerns, researchers and policy makers will be able to garner momentum around disseminating treatments and funding future research in these settings.

Prevalence of Childhood Psychosocial Dysfunction

Ever since Haggerty, Roghmann, and Pless introduced the concept of childhood psychosocial concerns as the "new morbidity" in primary care in 1975, researchers have attempted to discover what percentage of children and adolescents are affected by these problems. For example, in 1998 Roberts, Attkisson, and Rosenblatt reviewed 52 articles that were designed to find the prevalence rate of psychiatric problems among children and adolescents. The average prevalence rate found among those studies was 15.8%. However, the methods used to measure concerns and geographic location varied in studies, as did the results. The following section is a review of studies examining prevalence across key variables including method and setting.

Prevalence by Physician Report

As described above, the primary care setting is ideal for the identification, assessment, and treatment of psychosocial concerns, thus, many studies have involved this setting to determine prevalence. Costello (1986) reviewed studies that included over 126,000 children, where prevalence rates of childhood psychosocial concerns were determined by various methods including physician report, referral rates to specially services, or by specific diagnosis of an emotional or behavior problem. Overall, most studies had prevalence rates of between 4% and

7%, which is about half of the rate found by community epidemiologic surveys (Costello, 1986). These lower identification rates may be at least partially due to differences in study methodology and the fact that some studies based prevalence rates on the number of children who presented at a clinic in a given time, while other studies based rates on the total patient population of their clinic.

More recent research has revealed higher rates of psychosocial concerns in pediatric primary care. For example, McInerny et al. (2000) sampled physicians working in two large primary care networks, one of which had 480 clinics with representation in each of the 50 states. Participating physicians identified whether psychosocial problems were present in a consecutively referred sample of their patients (ages 4-15) by filling out a questionnaire after each visit. Based on 13,401 office visits by 401 physicians in this study, physician-reported prevalence rates of psychosocial concerns in 4 to 15 year old children was 19% (McInerny et al., 2000). In another study pediatricians interviewed in their urban practices estimated that 15% of their clients had a psychosocial disorder (Williams et al., 2004).

Prevalence by Parent Completed Screening

Brief psychosocial screening tools are quick, cost effective ways to accurately identify psychosocial dysfunction in children (Jellinek et al., 1999). One example of such a screening tool is the Pediatric Symptom Checklist (PSC), a 35-item parent report measure that detects psychosocial problems in pediatric primary care (Jellinek, Murphy, & Robinson, 1988). The PSC has been used in many studies (Massachusetts General Hospital, 2012) and has strong reliability (Chronbach alpha = .94; Boothroyd & Armstrong, 2010) and validity (Boothroyd & Armstrong, 2010; Jellinek et al., 1988). Jellinek et al. (1999) conducted a large national study that used the PSC to identify childhood psychosocial concerns within pediatric primary care.

The study involved "more than 21,000 pediatric outpatients drawn from the practices of 395 primary care clinicians representing 44 states, Puerto Rico, and 4 Canadian provinces" (Jellinek et al., 1999, p. 256). The study found that 13% of the 15,492 school age children and 10% of the 5,573 preschool age children surveyed had clinically significant psychosocial impairment. Higher prevalence rates were found across ages for children of parents with a high school education or less, for single parent families, and for males.

Palermo et al. (2002) used a subsection of the data reported by Jellinek et al. (1999) and studied a representative sample of over 14,000 school aged children in pediatric primary care. The study used the Functional Limitations Index (FLI) and the PSC, although specific findings regarding the prevalence of child psychosocial concerns as rated by the PSC were not reported. The FLI is a parent report measure designed to assess the ability of a child to independently function in physical, school, and self-care domains. The study found that 15% of children presenting in primary care had a limitation in their physical, school, or self-care related functioning. Having any psychosocial problem (as rated by the PSC) increased the likelihood that a child would have a functional limitation. Low parental education levels and the presence of a psychosocial concern were both predictors of deficits in child functioning (Palermo et al., 2002).

In another study Borowsky et al. (2003) had parents of 2028 children waiting to be seen in pediatric primary care clinics in a Metropolitan area of Minnesota fill out the Pediatric Symptom Checklist, regarding their 7 to 15 year old child. The study found that 11% of children had a clinically significant psychosocial problem as rated by the PSC. On average children who had come to the clinic because of an illness had higher prevalence rates of psychosocial concerns than children who had come for a well-visit.

Prevalence in Rural Areas

Knowing the prevalence of child behavior problems in rural areas is important because it provides insight into potential health disparities that warrant intervention. The National Institutes of Health define health disparities as, "differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States" (Pokras & Baquet, 2002, p. 430). The research literature has established that many physical and mental health disparities occur at a higher rate in rural areas compared to urban areas (Barker et al., 2011; Crooks, 2000; Hulme & Belgen, 1999; Lenardson et al., 2010). To date very few studies have considered prevalence rates of childhood psychosocial dysfunction in rural areas specifically. Differences in methodology as well as differing or lay definitions of what constitutes "rural" make comparisons of prevalence rates between rural studies difficult; a topic that is addressed later in this paper.

Overall, there is mixed evidence as to whether mental health prevalence rates are higher in rural areas. One recent study found that rates of mental illness in rural children may be slightly higher than in urban children (Lenardson et al., 2010). The authors of this study used data from the 2005-06 National Survey of Children with Special Health Care Needs (NS-CSHCN), which identified a nationally representative sample of children with mental illness via a parent report telephone screener. Of the over 363,000 children surveyed, nearly 41,000 were identified to have a special health care need, and of those, nearly 16,000 had a mental health problem (e.g., anxiety, depression, ADHD, etc.). Using a classification of rurality called the Rural-Urban Continuum Codes (RUCC), the prevalence of psychosocial concerns was compared across levels of rurality. The study found that rural children were slightly more likely (5.8%) to have a mental health problem than urban children (5.3%). Additionally, of those with mental

health problems, rural children were more likely (59.1%) to have behavioral problems than urban children (53.7%) (Lenardson et al., 2010). The authors acknowledge that socioeconomic status may have played a role in mental health prevalence rates, given that the rural population surveyed was poorer on average.

Jane Costello from Duke University has been one of the most active researchers in the area of rural childhood psychosocial dysfunction. Costello et al. (1996) created the Great Smoky Mountains Study of Youth, which was a large and representative longitudinal study of 9, 11, and 13 year olds from 11 counties in rural western North Carolina. The study, which controlled for poverty, found that the prevalence rate of youth having any DSM-III-R disorder (20.3%) was similar to rates reported in studies of urban youth (18.1%; Offord et al., 1987). Differences in prevalence rates between urban and rural youth as measured in the study were washed out after SES was controlled for. However, the way that the study classified participants as "rural" was not specified. Family poverty increased the risk that a child would have a disorder, especially a behavioral problem (Costello et al., 1996).

Using data (i.e. the same children) from the Great Smoky Mountains Study of Youth, Costello, Mustillo, Erkanli, Keeler, and Angold (2003) conducted a large representative longitudinal study that tracked the prevalence rates of psychiatric disorders in 1,420 school aged children from age 9 to 16. The study found that *at any one time*, an average of 13.3% of the children in the study had a psychosocial disorder as assessed by The Child and Adolescent Psychiatric Assessment (CAPA). This percentage is lower than the 20.3% mentioned in the study above because it refers to the prevalence rate at any particular point in time, not during the 3 months before the screening. However, the current study found that 36.7% of youth had at least one psychosocial disorder during the entire length of the study. The authors point out that this

finding supports the idea that the results of cross sectional studies of prevalence rates may be underestimates (Costello et al., 2003).

Smaller studies have found preliminary evidence that particular childhood psychosocial problems (e.g., depression) may have a higher prevalence in rural areas, even when taking poverty into account. A 2005 study asked nearly 300 rural high school students to complete a 20-item Center for Epidemiologic Studies Depression Scale. The study found a high level of depressive symptoms in 34% of its sample of rural Kentucky and Iowa adolescents, compared to an 8.3% national average (Peden, Reed, & Rayens, 2005). In that study depressive symptoms were predicted by "poor family relationships," "previous experience with suicide," and "lack of active coping strategies", but not by family income (Peden et al., 2005).

Risky behaviors and substance abuse are also a problem in rural areas. Higher rates of opiate use and prescription drug abuse by adolescents have been found in Appalachia, as well as an increased use of emergency rooms to deal with substance abuse problems and mental health emergencies in general (Appalachian Regional Commission and the National Opinion Research Center, 2008). One study using survey data from nearly 70,000 randomly selected youth from the 2002 – 2004 National Survey on Drug Use and Health compared rates of substance abuse by youth and young adults in metro, rural-adjacent, large rural, and small rural areas (Lambert, Gale, & Hartley, 2008). The study found that young adults who lived in small rural areas were more likely than metro young adults to engage in several types of risky behaviors. These rural young adults abused methamphetamines and Oxycontin at twice the rate of metro young adults and were more likely than any other group to abuse alcohol, drive under the influence, and engage in binge drinking (Lambert et al., 2008).

Using data from the 2003 Youth Risk Behavior Survey (YRBS), Johnson et al. (2008) found that rurality was not a protective factor against violence and drug use. Their results indicated that drug and alcohol use were equivalent across all levels of rurality. In addition, rural teens reported equal or higher levels of violence and suicidal behavior than suburban or urban teens. These results were drawn from YRBS school-based questionnaires. Further evidence of high rates of rural suicide was found in a literature review by Hirsch (2006). While overall findings were mixed, the review showed that many studies found a higher prevalence of suicide in rural areas than in urban areas (Hirsch, 2006).

Prevalence in Rural Primary Care.

Few studies address prevalence rates of childhood psychosocial concerns in rural primary care specifically. Determining prevalence rates in this setting is important, given the numerous health disparities and barriers to care that many rural residents face. Two studies to date have found higher rates of childhood psychosocial concerns in rural primary care than have been found in national studies. Polaha et al. (2011) administered the PSC to 570 parents in three pediatric primary care waiting rooms in rural Appalachia. Children of these parents were between 4 and 16 years old. Results of the study indicated that 21% of the children surveyed scored in the clinically significant range for psychosocial problems. In this study low paternal education was associated with increased PSC scores. The 21% prevalence rate found in this rural study is higher than national averages of 10%-14% found by Jellineck et al. (1999).

In a study in rural Nebraska Cooper et al. (2006) had research assistants observe 302 rural pediatric primary care appointments and code psychosocial concerns raised by parents or providers. The majority of the time (74%) concerns were raised by parents rather than by the physician. The study found that psychosocial concerns were raised in 23.6% of appointments

(33% when children ≥ 4 years old were considered), and when these concerns were raised, appointments lasted 5 to 7 minutes longer (Cooper et al., 2006). It is difficult to compare this study to prior work, however, because 1) it is the only study to use observation rather than reports and 2) "psychosocial concerns raised" does not necessarily mean "clinically significant," which was the dependent variable in other studies.

In conclusion, it is difficult to draw conclusions from outcomes of studies of prevalence rates of childhood psychosocial concerns because results may vary based on type of reporter, setting, assessment tool, geographic location, and population (e.g., low SES).

Explaining the Evidence

It is important to consider the methodological differences and limitations of studies of rural primary care because they have implications on the prevalence rates the studies determined. For example, consider the studies by Polaha et al. (2011) and Cooper et al. (2006) discussed previously. First, the two studies varied in the way psychosocial concerns were assessed. The Cooper study used graduate students in the exam room recording when concerns came up, while the Polaha study used a parent report screener that was administered before seeing the physician. The presence of research assistants in the exam rooms in the Cooper study may have caused the physician or patient to act differently than they normally would. Additionally, the fact that psychosocial concerns were raised during the appointment does not necessarily mean that the child had a clinically significant psychosocial concern. Second, the sample of patients surveyed in the two studies differed demographically. The Cooper and colleagues study observed only a small number of physicians practicing within an insured population in rural Nebraska, while the Polaha study engaged a broader sample of patients from rural Appalachian primary care clinics with various levels of rurality. While Cooper claimed to study "rural" primary care clinics, no

formal definition or explanation of what constituted "rural" was provided. Additionally, neither study considered in depth how SES factored into prevalence rates.

The reasons that the two studies described above found higher prevalence rates of childhood psychosocial concerns than national studies could be due to several factors. Mental health provider shortages, which are common in rural areas (Gale, Loux, Shaw, & Hartley, 2010; Hendryx, 2008), may lead to an overrepresentation of mental and behavioral health problems in primary care. Worries that they or their child may be stigmatized for seeking treatment may also lead parents in rural areas to seek services in primary care rather than traditional mental health venues (Jameson & Blank, 2007). Higher rates of health disparities in rural areas may also increase prevalence rates in primary care (Polaha et al., 2011). Finally, methodological limitations in the studies could have led to inaccurate prevalence rates. For example, Polaha et al. used three different methods of data collection, including use of front desk staff, nurses, and finally research assistants in the waiting room. No analysis was performed to determine which of these methods, if any, was superior.

These studies, along with what is known about health disparities in rural areas, provide a glimpse of prevalence rates of childhood psychosocial concerns in rural primary care. More studies are needed, however, to understand how rural areas compare to the rest of the nation because the results have implications for how these concerns may be treated in an integrated care setting.

Barriers: Reasons Health Disparities Exist

In an effort to understand the prevalence of childhood psychosocial concerns in rural primary care it is helpful to consider barriers to care that are commonly associated with the development of health disparities in rural areas. Some of these barriers include lack of access to

appropriate mental health facilities, socioeconomic disadvantage, limited education, and logistical barriers such as lack of transportation. Research shows that the role played by socioeconomic disadvantage is substantial (American Psychological Association, 2012) and this topic is covered in more detail later in the paper.

Access. Access to professional mental health services is a major problem for many rural residents. One study found that only 2%-6% of Rural Health Clinics that provide services in medically underserved areas offer mental health services by a doctoral level psychologist or social worker (Gale et al., 2010). Problems with Medicare reimbursement and with recruiting mental health professionals to the region were cited as reasons for such low percentages.

Rural residents in Appalachia may have a particularly difficult time accessing mental health care, even when compared to other rural areas. A 2008 study found that nearly 70% of the 268 nonmetropolitan counties in Appalachia were mental health professional shortage areas (Hendryx, 2008). This rate of health professional shortage is higher than in nonmetropolitan counties located outside of Appalachia but in the same state.

Despite rural mental health professional shortages, the majority of residents in both rural and urban areas have a primary care physician (PCP) (South Carolina Rural Health Research Center, 2008). There are, however, fewer PCPs per each resident in rural areas than in urban areas. One study found that rural areas, on average, have only one PCP for every 1,461 residents. Urban areas, on average, have one PCP per 880 residents (South Carolina Rural Health Research Center, 2008). This may be one reason, in addition to isolated locations, that rural residents have a harder time accessing their PCP after regular business hours (Ziller & Lenardson, 2009).

Education. Limited education is correlated with poverty (U.S.D.A., 2003) and contributes to poor health literacy, which is defined by Healthy People 2010 as, "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Nielsen-Bohlman, Panzer, & Kindig, 2004, p. 2). Poor health literacy can lead to poor preventative care measures and more negative health outcomes. A 2004 report found that as many as 90 million people have poor health literacy (Nielsen-Bohlman et al., 2004). Residents of rural areas may be particularly at risk because research shows lower education attainment of rural residents compared to urban residents (U.S.D.A., 2003). High school completion rates are especially low in central Appalachian counties, as are college completion rates.

Logistics. Lack of transportation may also negatively affect health outcomes for rural residents because it can be a struggle to access health care providers. Over 1.6 million families living in rural areas do not have a vehicle and must rely on public transportation (U.S.D.A., 2005). However, only 60% of rural counties have public transportation available. A large proportion of these carless residents live in Appalachia, where the physical geography makes it especially difficult to travel (U.S.D.A., 2005).

The increasing cost of healthcare is a logistical barrier that both rural and urban residents face. However, rural residents may be less financially equipped to cope with these increasing costs. According to the USDA, a higher percentage of nonmetropolitan residents live in poverty compared to metropolitan residents. Additionally, poverty rates are increasing at a higher rate in nonmetropolitan areas (U.S.D.A., 2011).

Summary

In an effort to explain the evidence behind prevalence rates of childhood psychosocial problems, it is important to consider both methodological differences between studies and existing barriers to care (e.g. access, education, and logistics) that create health disparities in rural areas. Three methodological concerns of studies that examine childhood psychosocial concerns in rural areas are 1) many studies do not examine the role of SES, 2) multiple (or nonexistent) definitions of rural are used across studies, and 3) differing measures and informants are used across studies, making comparisons between studies difficult. These concerns stand in the way of researchers having a good grasp of prevalence rates of childhood psychosocial concerns in rural primary care. Conceptualized in terms of Bronfenbrenner's ecological model (Bronfenbrenner, 1994), these concerns are important because they represent macrosystem-level contextual factors that may influence the development of childhood psychosocial concerns. Each of these concerns is now considered at length.

Socioeconomic Variables and Psychosocial Concerns

Overview

A large amount of research links low family income to a variety of physical and mental health problems (Fryers, Melzer, & Jenkins, 2002; McLoyd, 1998) including psychosocial problems in children (McLeod & Shanahan, 1993). Fryers et al. (2002) reviewed nine large studies across several countries that looked at the relationship between socioeconomic status (SES) and mental disorders. In these studies SES was measured in a variety of ways including occupational social class, employment status, material standard of living, and education. The study found that lower SES was associated with a higher prevalence of mental disorders. Of all the variables in this study, education was one of the strongest predictors of mental health

outcomes. Likewise, one 9-year longitudinal study comparing Dutch and American samples of 8 to 16 year old children found that parental SES predicted both internalizing and externalizing problems in children with few differences between countries (van Oort, van der Ende, Wadsworth, Verhulst, & Achenbach, 2011).

This section addresses theories that attempt to explain the relationship between SES and mental health status, the role that income poverty plays in the development of psychosocial concerns in children, the SES of rural residents, and common ways SES is measured in the literature.

Social Causation versus Social Selection

Research has shown that people with low SES are more likely than those with high SES to have a mental illness (American Psychological Association, 2012). Two main theories have been proposed to explain the association between SES and mental health outcomes: social causation and social selection. Social causation theory posits that the environmental conditions associated with poverty and low SES cause mental illness to develop in an individual. While a genetic component may be present, its influence is thought to be triggered by the stresses and circumstances of living in poverty (Costello, Compton, Keller, & Angold, 2003). Alternatively, social selection theory postulates that genetic factors cause mental illness independent of SES that in turn causes an individual to drift down the SES ladder because of impairment in some type of functioning (Wadsworth & Achenbach, 2005).

Social causation and social selection were once competing theories, but modern research has shown that both may be at work in different circumstances. Several studies have shown that social causation may play a larger role in explaining how low SES is associated with a higher prevalence of behavioral and emotional problems in children. In one longitudinal study

Wadsworth and Achenbach (2005) followed over 1,000 children for 9 years and found over that time more new cases of childhood psychopathology developed in the children from lowest SES backgrounds, supporting a social causation explanation. Additionally, children's psychosocial problems in the low SES group did not improve as much as those in the higher SES groups. Further support for a social causation explanation is found in a longitudinal study that tracked children's psychosocial problems in a Native American reservation. The addition of a casino on the reservation increased the income of everyone living on that land. Many residents who had lived in poverty were now above the poverty line. Children in these families experienced a significant reduction in externalizing symptoms after the family had more money (Costello et al., 2003).

One mechanism by which low SES might impact psychosocial concerns in children via social causation is through parenting style. For example, harsh and inconsistent parenting at least partially mediates the relationship between low SES and psychosocial problems in children (McLoyd, 1998). Increased stressors in poor parents' lives (as a result of living in poverty) increase their reliance on these ineffective types of parenting styles. In a seminal review of the literature, McLoyd (1998) concluded that poor adults have more mental health problems, more negative life events, and more chronic stressors than adults who are not poor. Each of these traits has been linked to increases in coercive and hostile parenting practices that predict more psychosocial problems in children (McLoyd, 1998). The impact of poverty on parenting practices may be seen across generations. A longitudinal study that followed 191 children in rural areas found that growing up in poverty during adolescence predicted earlier entry into parenthood, which predicted more reliance on harsh parenting. Harsh parenting predicted an

increase in externalizing problems in the children, which furthered harsh parenting practices (Scaramella, Neppl, Ontai, & Conger, 2008).

Income Poverty

Regardless of whether it is viewed through a social causation or social selection lens, poverty is associated with a variety of negative physical, cognitive, achievement, and behavioral health outcomes for children (Fryers et al., 2002; McLoyd, 1998). Poor children are twice as likely to have stunted growth, 1.4 times as likely have a learning disability, and more than twice as likely drop out of high school compared to children who were not poor (Brooks-Gunn & Duncan, 1997). Additionally, poor children are more likely to have had an emotional or behavioral problem the last 3 months or more but are less likely to have ever been treated for such a problem (Brooks-Gunn & Duncan, 1997). A review of the literature examining the effects of low socioeconomic status on children found that children who live in poverty have higher rates of psychosocial problems than children who do not (McLoyd, 1998)

Differences in the amount of time a family spends in poverty, however, may lead to different outcomes for children. Some families may live in poverty their entire lives, while others may only experience it for a very short time. In a study using data from the National Longitudinal Survey of Youth (NLSY), McLeod and Shanahan (1993) found that persistent poverty predicted internalizing symptoms in children, but that current poverty status only predicted externalizing symptoms. Later work by McLeod and Shanahan provide evidence of the detrimental effects of persistent poverty on children. Using data from the NLSY, they found that the longer children were poor from 1986 to 1990, the more they displayed antisocial behavior during those years (McLeod & Shanahan, 1996). Additionally, a longitudinal study by Strohschein (2005) also using NLTS data found that children in families who were persistently

poor had worse mental health problems than families who slid into poverty from a higher income. The study also considered the differential effects that stable and dynamic income have on children's mental health. Families whose income dropped during the study had children with higher rates of depression and antisocial behavior than families whose income increased (Strohschein, 2005).

SES of Rural Residents

Even after controlling for access to care, one study found that rural children are 20% less likely to have a mental health visit than urban children (Lambert, Ziller, & Lenardson, 2009). One reason for this may be that those with low SES do not have the resources to get mental health services. As of 2011 more nonmetropolitan residents were living in poverty than metropolitan residents (U.S.D.A., 2011). Low SES is visible in the Appalachian region through high levels of unemployment, low incomes, and low educational attainment. Low SES affects rural residents' health directly.

One study found that rural residents, more than urban, are likely to put off receiving health care because of costs (South Carolina Rural Health Research Center, 2008). Similarly, a lack of insurance, also associated with low SES, contributes to both mental and physical health inequalities. As rurality increases, the number of uninsured residents also increases (South Carolina Rural Health Research Center, 2008). A 2008 study using 2001-2002 Medical Expenditure Panel Survey data found that one third of families living in the most rural areas have at least one family member who is uninsured. Additionally, rural residents are more likely than urban residents to have none in their family covered by health insurance (Ziller, Coburn, Anderson, & Loux, 2008) and to pay out-of-pocket for their medical bills (Ziller, Coburn, & Yousefian, 2006).

Measuring SES

No universally accepted definition of SES currently exists in the healthcare literature. However, common elements to definitions include emphasis on one's social hierarchy and access to desired resources (Oakes & Rossi, 2003). Oakes and Rossi (2003) propose that SES is a function of one's material, human, and social capital.

SES is measured either by composite or proxy variables. Composite measures (e.g. Duncan Socioeconomic Index; National Statistics Socioeconomic Classification) combine several variables such as income, occupation, and educational attainment into a single measure. Researchers assign weights to the relative contributions of the individual variables so that a single measure of SES is created. Composite measures may be able to provide a more complete and nuanced picture of the sample under investigation. Researchers often disagree, however, on the way the individual variables that make up the composite should be weighted (Oakes, n.d.). Additionally, obtaining accurate and complete data on each variable of the composite measure can be difficult for researchers because subjects may be reluctant to provide the information. Study methodology may also limit the feasibility of collecting the data (Oakes, n.d.).

Proxy measures of SES (e.g. income, wealth, educational attainment) are based on a single variable. Although these measures may not provide as complete a picture as composite measures, they are more feasible for researchers to collect. Parental educational attainment is frequently reported in the childhood psychosocial literature and is often used as a proxy for SES (Brugman, Reijneveld, Verhulst, & Verloove-Vanhorick, 2001; Dubow, Boxer, & Huesman, 2009; Horwitz, Leaf, Leventhal, Forsyth, & Speechley, 1992; Jellinek et al., 1999). For adults, educational attainment does not fluctuate as much as yearly income and may be more likely to be reported accurately. In a review article that summarized studies that used social determinates of

health to explain health disparities in rural areas, the three most commonly used metrics of SES were income, educational level, and occupation (Dixon & Welch, 2000). Findings did not differ based on which proxy for SES was used.

While SES certainly affects childhood psychosocial concerns, studies of these concerns in rural areas often use multiple definitions of rural, making comparisons between studies difficult. Because rurality, like SES, is a macrosystem-level contextual factors that may influence the development of childhood psychosocial concerns, it is important to consider in detail how it is commonly defined.

Definitions of Rural

While most Americans may have an intuitive sense of what it means to be urban or rural, a myriad of technical definitions by federal offices define rurality in different ways based on different geographical units. The way that rural is defined is very important because many funding and policy decisions are made based on whether an area is classified as rural or not. The way that rural America is portrayed in the research literature, and in popular culture, depends on which definition of rurality researchers choose in their studies. Conclusions about the character and demographics of rural America may change when the definition of rurality changes. Researchers need to have an in-depth understanding of the advantages and disadvantages of the particular definition of rurality they are using and make sure to explicitly state which measure of rurality their study used.

U.S. Census Bureau

The two primary systems researchers use to define urban and rural were designed by the U.S. Census Bureau and the Office of Management and Budget (OMB). Census blocks are the smallest geographical unit the U.S. Census Bureau keeps full demographic data for and are the

basis for the Bureau's definition of urban and rural areas (U.S. Census Bureau, 2011). Territories are categorized as Urbanized Area (UA), Urban Cluster (UC), or Rural on the basis of population and population density in a highly technical process that is beyond the scope of this paper. A basic description of the process is provided, however.

Census blocks and block groups that have a population density of at least 1,000 people within a two square mile area are designated as a core area. Adjacent blocks are added to these cores that have a density of 500 people per square mile (U.S. Census Bureau, 2011). If, after this process, the resulting area has a population of 50,000 or more, it is classified as an Urbanized Area. If the resulting area has a population of 2,500-50,000 it is classified as an Urban Cluster. All areas (census blocks) that are not part of a UA or UC are defined as Rural (U.S. Census Bureau, 2011). This is the only official federal definition of rural (Coburn et al., 2007).

Office of Management and Budget

Instead of using census block data, the OBM defines Core Based Statistical Areas (CBSAs) at the county level. First, one or more central counties are distinguished where at least 50% of the population lives in a U.S. Census defined UA or UC of at least 10,000 people. Second, outlying counties are added if at least 25% of its residents work in the central county or if 25% of the outlying county workforce lives in the central county (Office of Management and Budget, 2010). The resulting territory is called a CBSA. If the CBSA contains an UA (50,000+ people), it is labeled a Metropolitan Statistical Area (MSA). If the CBSA is based in an UC with at least 10,000 people, it is labeled a Micropolitan Statistical Area. Counties that are not part of a CBSA are Outside Core Based Statistical Areas (OCBSAs). The term "Nonmetropolitan" refers to Micropolitan Statistical Areas as well as OCBSAs (Office of Management and Budget, 2010).

Andrew Isserman of the University Illinois, Urbana, has written at length about ways in which the OMB definitions have been misunderstood and misused by researchers, policy makers, and even those at the United State Department of Agriculture Economic Research Service, who are supposed to be the premier organization for studying rural economics (Isserman, 2005). Isserman points out that the U.S. Census Bureau and OMB definitions have very different purposes. The purpose of the U.S. Census Bureau system is to *separate* and differentiate areas into either urban or rural. The OMB system, alternatively, is to show how rural and urban areas *integrate* into Metropolitan or Micropolitan Statistical Areas. This system shows how areas are economically tied to each other by commuting patterns. The OMB explicitly states that "… the Metropolitan and Micropolitan Statistical Area Standards do not produce an urban-rural classification, and confusion of these concepts can lead to difficulties in program implementation." (Office of Management and Budget, 2010, p. 37246).

Despite this warning, it is common to find published articles that equate Metropolitan to urban and Nonmetropolitan to rural (Isserman, 2005). When researchers use the OMB standards in an inaccurate way, they may inadvertently mislead their audience because Metropolitan and Nonmetropolitan do not necessarily match up with many Americans' perceptions of rural (e.g. sparsely populated land) and urban (e.g. populated cities) (Isserman, 2005). For example, the Grand Canyon is in a Metropolitan Statistical Area. In fact, as of the 2010 census, the majority of rural Americans live in Metropolitan Statistical Areas (Isserman, 2005). When researchers treat Metropolitan as urban and Nonmetropolitan as rural, they are actually ignoring the majority of rural Americans and ignoring the purpose that CBSAs were created in the first place (to measure integration between communities) (Isserman, 2005).

USDA, Economic Research Service: Rural-Urban Continuum Codes

In an effort to rate rural areas on a continuum, the Economic Research Service developed Rural-Urban Continuum Codes (RUCC) (U.S.D.A., 2004). RUCCs rate counties on a scale from 1 to 9. Metropolitan counties are categorized within numbers 1-3 of the code while Nonmetropolitan counties fall between numbers 4 through 9. Metropolitan counties are ranked based on how many people fall within their Metropolitan Statistical Area, with 1 representing Metropolitan areas of 1 million or more people (U.S.D.A., 2004). Nonmetropolitan counties are coded based on the urban population of the county and whether or not the county is adjacent to a Metropolitan area (U.S.D.A., 2004). While the RUCC allows for more detail than just Metropolitan versus Nonmetropolitan, it still ignores that fact that over half of rural residents live in Metropolitan counties (Isserman, 2005). Thus, it can often categorize very different counties as similar and very similar counties as different (Waldorf, 2007).

USDA, Economic Research Service: Rural-Urban Commuting Areas

Another categorization of urban and rural called Rural-Urban Commuting Areas (RUCAs) was developed by the Economic Research Service and the University of Washington Rural Health Research Center (U.S.D.A., 2005). RUCAs are based on Census Bureau definitions of UA and UC and consist of 10 whole number codes as well as additional decimal level codes, creating 33 codes in all (WWAMI Rural Health Research Center). The codes, which are available in both zip code and census tract format, differentiate between Metropolitan, Micropolitan, small town, and rural areas based on population density and commuting patterns. However, the codes can be aggregated in many ways to come up with dichotomous or continuous measures of rurality (WWAMI Rural Health Research Center). The way these codes are aggregated is determined by the purposes of the researcher or agency conducting the study.

Continuous measures retain more nuances in the data and more accurately reflect the fact that few places are totally urban or totally rural. If a dichotomous coding scheme is used, however, the researcher should explain how and why the rural-urban distinction was derived (Cromartie & Bucholtz, 2008).

Rurality and Psychosocial Concerns in the Literature

Psychological researchers differ in their level of specificity when stating how they define what is considered "rural" in their studies. A great deal of variability exists within the literature because researchers often define rural in an unstandardized way that is convenient for them, even though it may be contrary to established definitions of what is considered rural (Larsen & Dehle, 2007). Studies often do not disclose the size of the communities they describe, and when they do, there is considerable variability. For example, rural has been defined as consisting of less than 2,500 residents all the way up to consisting of 25,000 residents, depending on the study (Scaramella & Keyes, 2001). This causes the scientific community as well as the public to form inaccurate and incomplete perceptions of the state of rural America and the people who live there.

There is no one definition of rural that can be used in all circumstances or that is universally accepted (Cromartie & Bucholtz, 2008). When choosing a rural definition for a study, the important question is not whether the definition is "good" or "bad" but rather whether the definition is being appropriately and intelligently applied given the circumstances and goals of the study. Problems arise when researchers choose definitions based on their perceived convenience without knowledge of the implications. For example, assuming "Metropolitan" equates to "urban" in the OMB definition of rurality overlooks the fact that over 50% of Census-defined rural individuals live in Metropolitan areas. The most common rural definitions that are

used in government research and policy are the U.S. Census Bureau definition and the Office of Management and Budget definition (which have previously been described) (Coburn et al., 2007). However, the decision of which definition of rurality to use often depends on what data are available to the researcher (Coburn et al., 2007).

Because different researchers even in the same field may use different definitions of rural, comparisons of results between studies cannot necessarily be made directly. For example, one prominent study of the prevalence of psychosocial problems in rural youth (Costello et al., 1996) defined "rural" based on the population density of the region. Alternatively, another author studying the prevalence of depression among rural youth (Peden et al., 2005) compared participants who either did or did not live on a farm, but never formally defined what constituted rural in the study. Finally, an author studying the prevalence of risky behaviors among rural youth used a continuous measure of rurality that equated rural with Nonmetropolitan, urban with living in a central city in a Metropolitan area, and suburban with living in a metropolitan area outside a central city (Johnson et al., 2008). These examples all make claims about "rural" youth, yet each is sampling from a potentially different demographic of people.

In the search to more fully understand rural childhood psychosocial concerns, no studies have examined how adopting alternative definitions of rural may differentially influence the results of their studies. Studies are needed that compare multiple definitions of rural in the same study in order to get a more accurate understanding of what employing a specific definition of rural means.

Summary and Purposes of Current Study

In summary, because evidence from national studies shows childhood psychosocial concerns are often brought up and treated in the primary care setting (Cooper et al., 2006;

Jellinek et al., 1999), examining the prevalence of these concerns in this venue is imperative. This is particularly true in rural areas, where health disparities and barriers to care may impact prevalence rates. Presently, studies of children's psychosocial concerns in rural primary care settings have not adequately addressed complex contextual factors such as rurality and SES. Research is needed that not only documents prevalence rates of child psychosocial concerns in rural primary care but that examines how applying different definitions of rural, as well as studying how SES and rurality interact, affects prevalence rates of these concerns. Therefore, the purposes of this study were to explore the relationship between rurality, SES, and child psychosocial concerns:

1. To document the prevalence of childhood psychosocial concerns in pediatric primary care using a large representative sample from rural, southern Appalachia.
2. To examine various measures of rurality and how they explain the variance in psychosocial screening scores (specifically PSC scores);
3. To determine if the relationship between rurality and child psychosocial concerns might depend on the level of SES (specifically parental education).

Concerning the first purpose of the study, it was hypothesized that the prevalence of child psychosocial concerns in rural primary care would be higher than broader national samples have found due to lacking mental health services and barriers to care found in rural areas. Concerning the second purpose of the study, it is hypothesized that the Rural-Urban Commuting Area (RUCA) definition of rurality will explain the most variance in children's PSC scores. RUCAs are based on the Census Bureau definition of rural, and as such, are able to examine data on the zip code level (as opposed to a larger county unit). This smaller geographic unit may

provide a more accurate explanation of how children's psychosocial concerns vary across location.

Concerning the third purpose of the study, it is hypothesized that parental education will moderate the relationship between rurality and children's PSC scores. It is predicted that high parental education may provide a protective factor against many of the health disparities and barriers to care common in rural areas, and as such, be associated with similar prevalence rates of child psychosocial concerns across rural and less rural areas. Low levels of parental education was predicted to be associated with higher rates of child psychosocial concerns in both rural and less rural areas (compared to high parental education). However, because of the health disparities and barriers to care already present in rural areas, low SES was predicted to affect these children to a greater extent and be associated with the highest rates of psychosocial concerns.

CHAPTER 2

METHODS

Participants

Parents of 2,672 children ages 4 to 16 were recruited in the waiting rooms of eight pediatric primary care clinics in southwest Virginia and northeast Tennessee (see Figure 1). Data were collected in the context of a larger study examining the role of stigma on parents' willingness to seek help for their children's psychosocial problems.

Measures

Demographic questionnaire. The demographic questionnaire (Appendix A) asked the respondent to list their relationship to the child (e.g. mother, father, or other), as well as the child's age, date of birth, and gender. The questionnaire also asked for county, zip code, race, highest maternal and paternal education level, and whether the respondent had talked to any of the following about their child's behavior or emotional problems: teacher, pastor, close family member or friends, child's doctor, counselor or therapist, or other. Highest parental education level was used as a proxy for SES. Education level is an established proxy for SES in the literature and has been found to be one of the strongest predictors of mental health outcomes (Fryers et al., 2002).

Pediatric Symptom Checklist. The Pediatric Symptom Checklist (PSC; Appendix B) is a 35-item measure that was designed as a screening tool to detect psychosocial problems in pediatric primary care (Jellinek, Murphy, & Burns, 1986). The PSC includes statements such as, "Complains of aches and pains", "Spends more time alone", and "Has trouble with teacher" (Jellinek et al., 1986). Parents report whether a statement applies to their child "Never", "Sometimes", or "Often". Parents' responses of "Never" are given a score of 0, "Sometimes" is

given a score of 1, and "Often" is given a score of 2, resulting in a possible total score between 0 and 70. A clinically significant total score is considered 28 or above for school aged children and 24 or above for preschool aged children (Jellinek et al., 1988). The PSC also includes three subscales that gauge attention, internalizing, and externalizing disorders. The PSC is a frequently used measure (Massachusetts General Hospital, 2012) and has strong reliability and validity (Jellinek et al., 1988). A recent analysis by Boothroyd and Armstrong (2010) found that the PSC had strong construct validity, internal consistency (Chronbach alpha = .94), and test-retest reliability (r=.77), as well as good sensitivity (.77) and specificity (.82). The PSC was used in this study because of its common use by researchers in primary care settings, and so the results of this study could be directly compared to national prevalence rates of child psychosocial concerns found by Jellinek et al. (1999).

Rural Definitions. In order to compare how different definitions of rurality explain the variance in child psychosocial concerns, it was important to choose a variety of rural definitions that were a) common in the literature and b) distinct enough to warrant comparison. County and zip code variables were used to determine each participant's rural status according to six different definitions of rurality: Census Bureau, OMB Core Based Statistical Areas, RUCC, RUCA, IRR, and UIC. These definitions were chosen because of their frequent use in the literature and their consideration of differing factors that contribute to a location being considered rural (e.g. population density, commuting patterns, distance from highly populated area, etc.). Each definition of rurality and the rationale for choosing it for this study is briefly highlighted below.

U.S. Census Bureau. The only official definition of rural in the federal government is provided by the U. S. Census Bureau (Coburn et al., 2007). Census blocks are categorized as an

Urbanized Area, Urban Cluster, or Rural based on population and population density (U.S. Census Bureau, 2011). This definition was chosen for analysis because it has a long history of use and because it is primarily based on population and population density. The Census Bureau often approximates what lay conceptions of what rural "looks" like.

Office of Management and Budget Core Based Statistical Areas. This classification scheme differentiates Metropolitan, Micropolitan, and Outside Core Based Statistical Areas (OCBSAs) at the county level (Office of Management and Budget, 2010). This classification is not meant to be equated to a rural-urban definition because it measures the extent that urban and rural areas are integrated into Metropolitan and Micropolitan Statistical Areas. However, because researchers often use this classification as a proxy for urban-rural (incorrectly) in the literature, it is included in this study.

Rural Urban Continuum Codes (RUCC). Counties are ranked on a scale from "1" (most metropolitan) to "9" (most rural) (U.S.D.A., 2004). RUCCs are included in this study because they define rural on a continuum and are based on either the size of the metropolitan area or the urbanization and adjacency of a nonmetropolitan area to a metropolitan area (U.S.D.A., 2004). . RUCCs are tied to the OMB classification and are commonly reported in the literature.

Rural Urban Commuting Areas (RUCA). RUCAs are based on Census Bureau definitions of UA and UC and consist of 10 whole number codes as well as additional decimal level codes, creating 33 codes in all (WWAMI Rural Health Research Center). For this study, the codes were aggregated to form four levels of rurality, consistent with common usage: "urban focused" (codes 1.0, 1.1, 2.0, 2.1, 3.0, 4.1, 5.1, 7.1, 8.1, and 10.1), "large rural city focused" (codes 4.0, 4.2, 5.0, 5.2, 6.0, and 6.1), "small rural town focused" (codes 7.0, 7.2, 7.3, 7.4, 8.0, 8.2, 8.3, 8.4, 9.0, 9.1, and 9.2), and "isolated small rural town focused" (10.0, 10.2, 10.3, 10.4,

10.5, and 10.6). RUCAs were included in the study because they are rated on a continuum, but unlike RUCCs, which are tied to the OMB classification scheme, they are tied to the Census Bureau's Urban Area and Urban Cluster categorizations and are based on degree of urbanization, population density, and commuting patterns (U.S.D.A., 2005).

Urban Influence Codes (UIC). UICs are tied to the OMB classification system and rank counties from "1" ("in large metro area of 1+million residents") to "12" ("noncore not adjacent to metro or micro area and does not contain a town of at least 2,500 residents") based on the size of the county and its proximity to Metropolitan and Micropolitan areas (U.S.D.A., 2007). UICs are meant to show how the influence of population centers on surrounding counties.

Index of Relative Rurality (IRR). IRR is a continuous measure of rurality that ranks counties from 0.10 (most urban) to 0.90 (most rural) (Waldorf, 2006, 2007). Although its use in the literature is not as widespread as classification schemes previously mentioned, it was included in this study because it takes into account several factors such as population size, population density, percentage of urban (as defined by the Census Bureau) residents, and distance to metropolitan areas (as defined by OMB) (Waldorf, 2007).

Procedure

Research assistants approached parents of children aged 4 to 16 in the waiting rooms of pediatric primary care clinics. All parents were given a cover letter explaining the study, providing appropriate contact information, and asking for their participation. Any questions parents raised were answered by the research assistants, and for participants who could not read, the form was read to them. All parents or caregivers with children in the specified age range were approached unless the parent seemed too distressed to engage in informed consent. Of the 3,141 parents who were approached, approximately 17% (N = 529) declined to participate in the

study. Parents who agreed to participate in the study were asked to complete the Demographic Questionnaire as well as the Pediatric Symptom Checklist regarding the child they brought to the clinic that day. Parents returned completed forms to a secured drop box. Of the surveys that were returned, 34 were blank, the child was too young (less than 4) in 60 cases, and the child was too old (above 16) in 69 cases. This resulted in a final N of 2,672. All study protocols were approved by the East Tennessee State University Institutional Review Board.

Data Analysis Plan

1. In order to document the prevalence of childhood psychosocial concerns in pediatric primary care, each PSC was scored to determine it fell into the "clinically significant" range according to scoring guidelines. The overall prevalence of clinically significant PSC scores was compared across demographic variables.
2. In order to determine which measure of rurality explained the most variance in childhood psychosocial problems, a series of simultaneous regressions were conducted where PSC score was regressed on each definition of rurality separately to determine which explains the most variance. The measure of rurality that explained the most variance in PSC scores was used in subsequent analyses.
3. In a moderated regression, PSC scores were regressed on the rural definition that explained the most variance, parental education level (proxy for SES), and the interaction between rural status and parental education level. This determined if the relationship between rurality and child PSC scores was dependent on the SES of the parent. The variables of rurality and SES were entered in Step 1 of the regression. The interaction variable (the cross-product of centered rurality X SES) was entered in Step 2. Significant interactions were decomposed in line with suggestions of Aiken and West (1

SD above and below the mean; Aiken & West, 1991) to more closely examine the relationship between the two variables.

4. A power analysis was completed using a computer program called GPOWER 3 (Faul & Erdfelder, 1992). At 80% power with an alpha (probability of concluding that there is an effect when none exists) of .05, the sample size needed to detect a small effect size (f^2=.02) is 1,392. Because the sample size in this study is higher, it is likely that if an effect is present, there will be enough power to detect it. Thus, the probability of making a Type II error is low.

CHAPTER 3

RESULTS

Sample Characteristics

Demographic characteristics are shown in Table 1 (Appendix C). Participants (n = 2,672) ranged in age from 4 to 16 years old, with an average age of 8.73 years (*SD* = 3.46) and an equal distribution of males and females. The majority of screening respondents were White (n = 2,474; 92.6%) and were mothers (n = 2,068; 77.4%). The most frequently reported highest degree of education was high school for both mothers (n = 1,019; 38.1%) and fathers (n = 1,236; 46.3). On average, mothers (n = 1,312; 49.1%) were more likely to have at least some college experience than fathers (n = 930; 34.8%).

Descriptive statistics of the sample based on each rural definition are described below and shown in Table 1. Due to the nature of the Appalachian region in which data were collected, the full ranges of some definitions of rurality were not represented. For example, no participants lived in an area with a RUCC of 4 or 5, or had an IRR score of above 0.69 (even though the scale goes to 1.0). Therefore, in addition to the standard six definitions of rurality discussed, analyses were also conducted on "condensed" versions of each definition, which generally separated the sample into "more rural" or "less rural." For example, RUCCs of 1-3 were considered "less rural" while RUCCs of 6-9 were considered "more rural." Components of definitions (e.g., individual RUCCs) that had fewer than five participants were not included in analysis because a majority of these participants reported living outside the study area (e.g., Virginia Beach).

U.S. Census. Census blocks are categorized as part of an Urbanized Area, Urban Cluster, or Rural area based on population and population density (U.S. Census Bureau, 2011). A majority (n = 1,921; 71.9%) of participants were classified as living in a Rural area under the

U.S. Census definition of rurality. There was a relatively equal distribution of participants who were classified as living in an Urban Area (n = 370; 13.8%) and an Urban Cluster (n = 327; 12.2%).

U.S. Census – Condensed. The U.S. Census definition of rurality was condensed by combining Urban Areas and Urban Clusters into the single category of Urban. The majority (n = 1,921; 71.9%) of participants lived in areas classified as Rural.

Office of Management of Budget (OMB). Under the Core Based Statistical Area (CBSA) definition of rurality set out by the OMB, areas can be classified as Metropolitan or Nonmetropolitan (which includes Micropolitan and Noncore). A majority (n = 1,658; 62.1%) of participants lived in a Metropolitan area, while most of the remaining participants (n = 961; 36.0%) could be classified as Noncore.

OMB – Condensed. The OMB definition of rurality was condensed by combining Micropolitan and Noncore into the single category of Nonmetropolitan (n = 986; 36.9%).

Rural Urban Continuum Codes (RUCC). RUCCs rank counties from "1" (most metropolitan) to "9" (most rural) based on the size of the metropolitan area or the urbanization and adjacency of a nonmetropolitan area to a metropolitan area. A majority (n = 1,654; 61.9%) of participants resided in a county with a RUCC of 3. Additionally, few (<4) or no participants lived in an area that had a RUCC of 1, 2, 4, or 5. Therefore, it was necessary to group RUCCs into the two categories of Less Rural (codes 1-3; n= 1658; 62.1%) and More Rural (codes 6-9; n = 986; 36.9%). By grouping the codes in this way, the sample was split along metropolitan-nonmetropolitan lines (because RUCCs 1-3 refer to Metro counties). The condensed version of this RUCC variable is essentially the same as a condensed version of the CBSA definition that also categorizes location along metropolitan-nonmetropolitan lines.

RUCC – Condensed. The RUCC definition of rurality was condensed into Less Rural (RUCC of 3) and More Rural (RUCC of 6 through 9). RUCCs of 1, 2, 4, and 5 were not included in analyses because they contained fewer than 5 participants.

Rural Urban Commuting Areas (RUCA). RUCAs are measured by zip code and are based on degree of urbanization, population density, and commuting patterns. A total of 33 codes can be combined in numerous ways depending on a researcher's purposes. Overall, 40.3% (n = 1,077) of participants lived in an Urban area, while most Rural residents lived in a Small Rural Town (n = 977; 36.6%) or Isolated Small Rural Town (n = 426; 15.9%). For the purposes of this study, RUCAs were combined according to Categorization A, B, and C, described below.

RUCA Categorization A. Categorization A classified participants as living in an area that was Urban (n = 1,077; 40.3%), Large Rural City/Town (n = 142; 5.3%), Small Rural Town (n = 977; 36.6%), or Isolated Small Rural Town (n = 426; 15.9%).

RUCA Categorization B. Categorization B also included Urban and Large Rural City/Town classification, but combined the categories of Small Rural Town and Isolated Rural Town into Small and Isolated Small Rural Town (n = 1,403; 52.5%).

RUCA Categorization C. Categorization C also included Urban classification, but combined the categories of Large Rural City/Town, Small Rural Town and Isolated Rural Town into Rural (n = 1,545; 57.8%).

Urban Influence Codes (UIC). UICs rank counties from 1 to 12 based on the size of the county and its proximity to Metropolitan and Micropolitan areas, with lower numbers signifying more urban influence (U.S.D.A., 2007). A majority (n = 1,606; 60.1%) of participants resided in a county with a UIC of 2, meaning a small metro area of less than 1 million residents. Another 20.5% (n = 547) of participants lived in a noncore county that contained a town of at least 2,500

residents that adjacent to a small metro area (UIC of 6). Overall, 38.8% (n = 1,037) of participants lived in a county with a UIC of 5-12.

UIC – Condensed. The UIC definition of rurality was condensed into Less Rural (UIC of 2) and More Rural (UIC of 5 through 8, 11, and 12). UICs of 1, 3, 4, 9, and 10 were not included in analyses because they contained fewer than 5 participants.

Index of Relative Rurality (IRR). The IRR is a continuous measure of rurality that ranks counties from 0.10 (most urban) to 0.90 (most rural) (Waldorf, 2006, 2007). A majority (n = 1,785; 66.8%) of participants lived in a county with an IRR of 0.40-0.59. There were few or no participants who lived in counties with an IRR below 0.20 or above 0.69.

Scores on the Pediatric Symptom Checklist (PSC) were used as the dependent variable in this study and are described below. PSC scores were analyzed across demographic characteristics, parental education levels, and measures of rurality (Table 2, Appendix C).

PSC Scores. The PSC is a parent reported measure of children's psychosocial concerns, with a possible range of 0 – 70. For preschool (ages 4-5) children, a PSC score at or above 24 indicates psychological impairment. The same is true for scores at or above 28 for school aged (ages 6-16) children (Jellinek et al., 1988).

PSC by Demographic Variables. The average PSC score for all ages was 14.93 ± 10.70. Independent samples *t*-tests (Table 3, Appendix C) were conducted to compare PSC scores across demographic and categorical rurality variables. Higher scores were found for school aged children (M=15.71 ± 11.13) than for preschool children (M=12.14 ± 8.45; $t(1138.04) = 8.13$, $p<.001$) and for males (M=16.06 ± 10.80) compared to females (M=13.79 ± 10.48; $t(2522.88) = -5.37$, $p<.001$).

PSC by Degree of Rurality. Considering the U.S. Census definition of rurality, higher scores were found for Urban school aged children (M=16.54 ± 12.00) compared to Rural school aged children (M=15.29 ± 10.73; $t(815.58) = -2.09$, $p<.05$). Under the Condensed OMB Core Based Statistical Areas definition of rurality, preschool aged children living in Metropolitan (M=13.06 ± 8.81) areas had higher PSC scores than children of the same age living in Nonmetropolitan areas (M=10.98 ± 7.83; $t(522.81) = -2.90$, $p<.01$). Identical results were found comparing More Rural vs. Less Rural preschool children under the condensed RUCC definition of rurality because the condensed CBSA and condensed RUCC definitions categorize the same groups of people and differ only in labels (e.g. "Metropolitan" vs. "Less Rural"). Finally, under the condensed version of the UIC definition, Less Rural preschool children (M=12.83 ± 8.68) had higher PSC scores when compared to More Rural children of the same age range (M=11.37 ± 8.15; $t(544) = 2.00$, $p<.05$).

A one-way ANOVA was conducted to determine if PSC scores of both preschool and school aged children combined differed by clinic location (Table 4, Appendix C). Homogeneity of variances was violated, as assessed by Levene's Test of Homogeneity of Variance ($\boldsymbol{p} = .04$). Average PSC scores were statistically significantly different between clinics ($\boldsymbol{F}(7,2524) = 3.45$, $\boldsymbol{p} < .01$). Games-Howell post-hoc analysis revealed that the mean PSC score difference between Rogersville and Elizabethton clinics (2.59, 95% CI [.25, 4.92]) was statistically significant ($\boldsymbol{p} <.05$), as well as the difference in score between Johnson City and Elizabethton (3.38, 95% CI [.82, 5.93], $\boldsymbol{p} <.01$).

When PSC scores were considered separately by age (Table 4, Appendix C), no significant differences were found between clinic locations for preschool children (ages 4-5). When school aged children (ages 6-16) were considered, a one-way ANOVA revealed

statistically significant differneces between clinics (***F***(7,1971) = 4.21, ***p*** < .001). Homogeneity of variances was violated, as assessed by Levene's Test of Homogeneity of Variance (***p*** = .02). Games-Howell post-hoc analysis revealed that the mean PSC score difference between Rogersville and Elizabethton clinics (2.74, 95% CI [.01, 5.46]) was statistically significant (***p*** <.05), as well as the difference in score between Johnson City and Elizabethton (4.36, 95% CI [1.40, 7.31], ***p*** <.001), Johnson City and Gray (3.85, 95% CI [.37, 7.33], ***p*** <.05), Johnson City and Abington (3.11, 95% CI [.34, 5.88], ***p*** <.05), and Norton and Elizabethton (3.56, 95% CI [.35, 6.76], ***p*** <.05).

Prevalence of Clinically Significant Psychosocial Concerns.

The first purpose of the study was to document the prevalence of childhood psychosocial concerns in pediatric primary care using a large representative sample from rural, southern Appalachia. Table 5 (Appendix C) shows the prevalence of clinically significant psychosocial concerns across demographic characteristics, measures of parental education, and measures of rurality. A higher percentage of school aged children (n = 311; 15.7%) exceeded the cutoff for clinical significance on the PSC than did preschool children (n = 56; 10.1%; $\chi^2(1, N = 2{,}532) = 10.78$, $p < .01$). Males (17.0%) were more likely than females (11.9%) to score in the clinically significant range ($\chi^2(1, N = 2{,}532) = 13.58$, $p < .001$), as were children when the screening respondent was someone other (23.8%) than the child's mother (13.8%) or father (10.3%; $\chi^2(2, N = 2{,}532) = 23.10$, $p < .001$). Mothers who had not completed high school were more likely to have a child score in the clinically significant range (24.6%), while mothers who had a 4-year college education (7.4%) or a postcollege education (6.2%) were less likely to have children who scored in this range ($\chi^2(5, N = 2{,}532) = 48.79$, $p < .001$). A similar pattern was present for paternal education. Overall, 14.5% (n = 367) of the sample exceeded the clinical cutoff. The

percentage of children who scored in the clinically significant range on the PSC did not differ by clinic location, $\chi^2(7, N = 2{,}532) = 12.02$, $p = .10$ (Table 6, Appendix C).

Does Rurality Predict PSC Score?

The second purpose of this study was to determine which definition of rurality explains the most variance in PSC scores. Therefore, several simple linear regressions were conducted where PSC score was regressed on each definition of rurality separately. Separate regressions were needed because the definitions were highly correlated with each other. Tables 7 – 17 (Appendix C) give details of each regression analysis conducted regarding rural definitions.

Summary of regression analysis. No definition of rurality significantly predicted PSC scores when children 4 through 16 were considered as a whole. When school aged (6-16) and preschool aged (4-5) children were considered separately, only the condensed version of the U.S. Census definition significantly predicted PSC scores for *school aged* children (Table 8, Appendix C; Adjusted R^2=.002, p<.05) . However, the amount of variance explained was small (0.2%). Five definitions significantly predicted PSC scores for *preschool* children, although the effect sizes were small: UIC (Table 15, Appendix C; Adjusted R^2 = .030, p<.01), RUCC (Table 10, Appendix C; Adjusted R^2 = .027, p<.01), RUCC condensed (Table 11, Appendix C; Adjusted R^2 = .013, p<.01), CBSA condensed (Table 9, Appendix C; Adjusted R^2 = .013, p<.01), and UIC condensed (Table 16, Appendix C; Adjusted R^2 = .005, p<.05).

Follow-up Analyses: Does Parental Education Predict PSC Score?

Although determining whether parental education predicted PSC score was not an original purpose at the outset of this study, it logically followed to complete this analysis given the findings from the Chi Square analysis of parental education and the prevalence of child psychosocial concerns (Table 5, Appendix C). Separate simultaneous regressions were

conducted where PSC score was regressed on the highest level of either maternal or paternal education. Details of these analyses can be found in Tables 18 and 19 (Appendix C). Considering all ages of children, results showed that both maternal (Adjusted $R^2 = .033$, $p<.001$; Table 18, Appendix C) and paternal (Adjusted $R^2 = .037$, $p<.001$; Table 19, Appendix C) education level significantly predicted PSC score. On average, more educated mothers had children who exhibited less psychosocial concerns as indicated by lower scores on the PSC than less educated mothers. In fact, mothers who had 4 years of college or more had children who scored, on average, more than 6 points lower on the PSC (M=11.98 ± 9.02) than children with mothers who had not completed high school (M=18.19 ± 11.47). A similar trend was observed regarding paternal education. When "does not apply" was endorsed concerning paternal education level, on average, children scored in the clinically significant range of the PSC (M = 20.92 ± 12.08) on average.

Does SES Moderate the Relationship Between Rurality and PSC Score?

The third purpose of this study was to determine if the relationship between rurality and PSC score is dependent on the SES of the parent. To explore this purpose, a moderated regression was conducted (Table 20, Appendix C). In the present study on average males had PSC scores that were 2.27 points higher (M=16.06 ± 10.8) than females (M=13.79 ± 10.48), indicating more psychosocial concerns. Additionally, on average, school aged children (ages 6-16; M=15.71 ± 11.13) had PSC scores that were 3.57 points higher than preschool aged children (ages 4-5; M=12.14 ± 8.45). Child age and child gender have also been shown in previous research (Jellinek et al., 1999) to be related to PSC scores. Therefore, the age and gender of the child were entered in the first step of the regression to control for the effects of these variables.

The rural definition that explained the most variance in preschoolers PSC scores (Urban Influence Codes), and maternal education level (proxy for SES) were added in step 2 of the

regression. Because both of these variables are categorical, they were dummy coded prior to analysis. UIC had 7 levels: 2, 5, 6, 7, 8, 11, and 12 (reference group). Maternal education had 6 levels: does not apply, did not complete high school, high school, 2 years of college, 4 years of college, and postcollege (reference group). The interaction between UIC and maternal education level was added in step three. This consisted of 35 interaction variables because every level of UIC was multiplied by every level of maternal education. Although the overall regression was significant ($F(39, 2{,}421) = 5.74$, $p<.001$, Adjusted $R^2 = .071$), maternal education did not moderate the relationship between rurality and SES. None of the interaction terms in step three were statistically significant. The large number of predictor variables may raise the question of whether the study had adequate power to detect significant results if they were present. A post-hoc power analysis was conducted using GPOWER 3 (Faul & Erdfelder, 1992). With 39 predictors, a sample size of 2,672, an alpha of .05, and an effect size of 0.09, the calculated power was 99%.

Summary

In regards to the first purpose of the study, 15.7% of school aged children (n = 311) and 10.1% of preschool children (n=56) had a clinically significant psychosocial concern (as rated by the PSC). Overall, 14.5% (n = 367) of the sample exceeded the clinical cutoff. These rates are slightly higher than but similar to national averages (Jellinek et al., 1999).

In relation to the second purpose of the study, rurality was not predictive of child PSC score when all children were considered. Regression analysis found that several rural definitions did predict PSC when preschool aged (e.g. Urban Influence Codes) and school aged (e.g. US Census – Condensed) children were considered separately, although the amount of variance explained was small.

In regards to the third purpose of the study, a moderated regression analysis found that the relationship between rurality and PSC score did not depend on the level of parental education. Other interesting findings relating to parental education, however, were present. For example, parental education significantly predicted PSC score, with more educated parents more likely to have children with fewer psychosocial concerns. The results and implications of this study are now considered in the context of relevant literature.

CHAPTER 4

DISCUSSION

Practitioners in rural primary care may experience greater burden due to health disparities in these areas, as well as a shortage of specialist providers. The purpose of this study was to evaluate the prevalence of child psychosocial concerns in primary care, hypothesized to be greater due to lacking mental health services in rural areas. Moreover, this study took into consideration varying definitions of rural as well as SES because these factors may influence prevalence rates and no other study has looked at these factors in depth.

Prevalence of Clinically Significant Psychosocial Concerns

Addressing the first purpose of the study, we found that nearly 15% of all children studied (preschool aged: around 10%; school aged: around 16%) had a clinically significant psychosocial concern as rated by the PSC. The prevalence rate in this study is slightly higher but quite similar to rates found by a national study that also used the PSC to identify childhood psychosocial concerns within pediatric primary care (Jellinek et al., 1999). Jellinek et al. found that 10% of the nearly 5,500 preschool age children and 13% of the nearly 15,500 school age children and surveyed had a clinically significant psychosocial concern. Like the present study, Jellinek et al. also found higher prevalence rates across ages for children of parents with a high school education or less and for males. Therefore, the prevalence of significant psychosocial concerns found in this study is consistent with national norms.

Rurality and PSC Score

The second purpose of the study was to consider six common definitions of rural and determine which definition impacted prevalence rates the most. With regard to the second purpose, we hypothesized that Rural Urban Commuting Areas (RUCAs) would be the most

useful rural definition because, 1) RUCAs categorize individuals on the zip code level, allowing for increased precision (compared to other definitions that categorize at the larger county level) and, 2) previous research (U. S. Department of Health and Human Services, 2011) using RUCAs found urban-rural differences in the prevalence of child psychosocial concerns. We further hypothesized that children in more rural areas would have higher PSC scores than children in less rural areas because of health disparities and increased barriers to care.

Our findings did not support these hypotheses. In fact, this study found that no rural definition significantly predicted PSC scores when both preschool and school age children were considered together. When preschool and school aged children were considered separately, Urban Influence Codes (UIC) stood out among rural definitions for its ability to explain differences in PSC scores for preschool children. Contrary to expectations, when differences in PSC score were found, children living in less rural areas tended to have slightly more psychosocial concerns than those living in more rural areas. Communities designated as "less rural" varied by rural definition but generally were located in metropolitan counties and in metropolitan areas with an urban area of 50,000 people or more. Communities designated as "more rural" also varied from areas that were even not close to a metropolitan or Micropolitan area and had a town of less than 2,500 residents, to areas that were adjacent to small metropolitan areas and had up to 49,999 residents.

The literature regarding the prevalence of mental health concerns among children in rural areas as compared to urban areas is equivocal. Some previous research links rural areas with slightly higher rates of child behavior problems (as measured by RUCC) and adolescent depression (Lenardson et al., 2010; Peden et al., 2005). The present study found that there were no rural-urban differences in PSC score for the group as a whole. These findings are consistent

with Costello et al. (1996) who found the prevalence of DSM-III disorders in rural Appalachian children was not significantly different from rates found in urban areas. Using similar methodology to the present study, Polaha et al. (2011) collected data in Appalachian primary care clinic and also did not find rural-urban differences based on RUCC, although they did find an overall higher prevalence rate of child psychosocial concerns (21%).

Parental Education and PSC Score

The third purpose of the present study was to examine if SES moderated the relationship between rurality and PSC score. Although not an original study purpose, a follow-up analysis to determine the impact of SES (as measured by parental education level) on prevalence rates of child psychosocial concerns in primary was also conducted. We hypothesized that, 1) a high level of parental education would serve as a protective factor and be associated with lower PSC scores than children with parents who had less education and 2) that the highest prevalence rates of psychosocial concerns would be found in children with the least educated parents who lived in the most rural areas.

The study found that parental education (both maternal and paternal) did predict children's PSC scores, with lower PSC scores being associated with more educated parents on average. The most educated mothers (who had a postgraduate education) had children who scored more than seven points lower on the PSC than children whose mothers had not completed high school, indicating fewer psychosocial concerns. Despite the link between parental education and PSC scores, this study did not find evidence of a moderating effect of parental education on the relationship between rurality and PSC score.

The finding that lower child PSC scores were associated with more educated parents is consistent with findings by the APA that low SES individuals are more likely than high SES

individuals to have a mental illness (American Psychological Association, 2012), based on a body of research that links low SES to a variety of physical and mental health problems (Fryers et al., 2002; McLoyd, 1998), including psychosocial problems in children (McLeod & Shanahan, 1993; Qi & Kaiser, 2003). Polaha et al. (2011) collected data at three Appalachian primary care clinics and condensed parental education into two levels: high school or less versus some college education or more. Significant differences were found in PSC score between children whose fathers had high school education or less versus those who had some college education or more. On average, mothers with a high school education or less had children with higher PSC scores than children of mothers with some college education or more, although this difference was not statistically significant.

Limitations

There are several important limitations to the present study that need to be considered. First, this study only sampled from pediatric primary care clinics in rural Appalachia and therefore may not be generalizable to other areas of the country. Also, by only sampling from primary care clinics, the study may have missed an important percentage of people who have children with such profound behavior problems and/or poverty that they never make it in to a primary care clinic. These families may live in the most rural areas where poverty is greatest and services are most sparse. It is questionable whether this population could be reached by telephone. Door to door surveys may be the best, albeit most labor intensive, option for reaching these families.

A second limitation of this study was that it only measured SES in one way. While parental education is an accepted proxy for SES in the literature, it would have been interesting to collect other data such as current family income, family income over time, and current job

status. Multiple SES variables might help differentiate whether education or access to resources has a greater impact on child psychosocial concerns.

A third limitation of this study was that it did not control for parental psychopathology. Considering that mental illness is heritible, it would be important to control for parental psychopathology because people who are a lower SES are more likely to have a mental illness than those with a higher SES (American Psychological Association, 2012). As mentioned previously in this paper, social causation and socail selection hypothesis have been proposed to explain this statistic. If a social selection hypothesis is at play, genetics would play a larger role than envrionment in the development of psychopathology.

A final limitation of this study was that the data collected were cross-sectional in nature. The data represent how children scored on the PSC at one point in time. In order to better understand how rurality, SES, and child psychosocial concerns are related, future studies should use longitudinal methods. In this way, the study could see if child psychosocial concerns change across time, geographic location, and SES level.

Conclusions

Taken together, the results of this study provide evidence that 1) behavior problems are prevalent in primary care, although not particularly more prevalent in rural compared to urban primary care and 2) parental education is an important risk factor for child psychosocial concerns. The present study found that 14.5% of children scored in a clinically significant range on the PSC, indicating a psychosocial problem. Comparing this prevalence rate with other common presenting concerns in primary care can put into perspective the magnitude of how important this issue is to address. For example, the childhood prevalence of asthma is 9.4% (CDC, 2012), of food allergies is 8% (Children's Memorial Hospital, 2011), and of diabetes is

0.26% (American Diabetes Association). The prevalence of child psychosocial concerns found in this study is consistent with the literature that shows that these concerns are the most common chronic condition in pediatric visits (Borowsky et al., 2003; Cooper et al., 2006; Jellinek et al., 1999; Kelleher et al., 2000).

In a national study using the PSC in primary care clinics, Jellinek et al. (1999) found prevalance rates of child psychosocial concerns (10% of preschool and 13% of school aged children) that were similar to the rates found in the present study (10% of preschool and 15.7% of school aged children). Both the present study and Jellinek et al. also found an impact of parental education in that children of lower SES parents tended to have higher PSC scores. In fact, the present study found that children with a mother who did not complete high school were nearly five times more likely (6.6% vs. 32.7%) to score in the clinically significant range on the PSC as children whose mothers had postcollege education. This finding has implications for primary care clinics who primarily serve low SES patients. Research has shown that the length of a primary care appointment increases when behavioral concerns are brought up (Cooper et al., 2006) and the present study (as well as others; Jellinek et al., 1999) has shown that a higher prevalence and severity of psychosocial concerns are associated with lower parental education. Therefore, clinics that serve a low SES population may be more likely to devote a larger percentage of their time dealing with these concerns. Integrating mental health professionals into these primary care settings may be one way to more effectively and efficiently address this increased need for behavioral health services.

The finding that parental education level is related to prevalence rates of child psychosocial concerns may also partially explain the differences in overall prevalence rates found between the present study (14.5%) and Polaha et al. (21%; 2011). Polaha et al. collected

data from three primary care clinics in Southwest Virginia and Northeast Tennessee, while the present study collected data from six sites in the same region. Given that there are substantial differences in parental education level throughout the region, if Polaha et al. collected data from sites that served a primarily low SES population, this could have led to the higher reported prevalence rate. The present study, alternatively, may provide a more global estimate of the region as a whole because there were twice as many data collection sites represented.

Although not an original hypothesis of the study, examining the prevalence rates of significant psychosocial concerns found at each of the eight primary care clinics via additional descriptive analyses may provide support for the assertion that SES may have been a factor in the high prevalence rates found by Polaha et al. For example, in the present study school aged children at the Johnson City (N = 338; 16.6%) and Norton (N = 341; 13.8%) clinic locations had significantly higher PSC scores than school aged children at the Elizabethton (N = 246; 11.0%) location. Considering that the Elizabethton clinic does not take Medicaid, it is reasonable to assume that they primarily serve a higher SES population. This difference in SES could be why PSC scores at this location were among the lowest of all eight clinics surveyed.

Parental education level was an important factor when considering child psychosocial prevalence rates in primary care settings, although the effects of rurality were not so apparent. One of the largest relevant and current studies that the results of the present study can be compared to is the Health and Wellbeing of Children in Rural Areas report published by the U.S. Department of Health and Human Services (HHS) in 2005. The study used phone surveys to collect data on over 90,000 children and adolescents between the ages of 3-17, based on parental report. Psychosocial concerns were examined across levels of rurality (as measured by RUCAs) and SES (as measured by family income). Like the present study, the HHS report found that as

family income decreased, the prevalence of moderate to severe socio-emotional difficulties increased. For example, children whose families lived at less than 100% of the federal poverty level (FPL) had rates of socio-emotional difficulties at nearly three times the rate of children whose families lived at 400% or more of the FPL (U.S. Department of Health and Human Services, 2005).

The HHS study also found differences in prevalence rates of socio-emotional difficulties between children living in urban, large rural, and small rural areas. As family income decreased, differences in prevalence rates between RUCA levels increased, with large rural areas showing the highest rates of socio-emotional concerns (U.S. Department of Health and Human Services, 2005). The present study did not replicate this finding, possibly because of differences in study methodology. For example, the present study used parental education as a proxy for SES while the HHS study used status above or below the poverty line. Additionally, the present study drew its sample only from a small area in Appalachia, while the HHS study used a more comprehensive and representative sample. Therefore, the HHS study was able to obtain a more accurate picture of how SES, rurality, and child psychosocial concerns are related on a national scale.

Why No PSC Score Differences Between Rural and Urban Areas?

Research has shown that many physical and mental health disparities occur at higher rates in rural areas compared to urban areas (Barker et al., 2011; Crooks, 2000; Hulme & Belgen, 1999; Lenardson et al., 2010). Rural residents also face mental health provider shortages and other barriers to care that may lead to an overrepresentation of child psychosocial concerns presenting in primary care settings (Polaha et al., 2011). Given this body of research, it is

important to consider why the present study did not find differences in PSC scores between more and less rural children on any of the six definitions of rural that were considered.

One possible explanation centers on the nature of the region that data were collected in. A part of the Appalachian region, much of Northeast Tennessee and Southwest Virginia are a mix of more rural and less rural areas. Extremely urban areas, as would be found in a large city such as New York or Chicago, are not present. Therefore, the full scale of each rural definition was not represented. For example, out of a 9-point Rural Urban Continuum Code scale, only 4 participants fell on the most urban end of the Continuum. On a 12-point Urban Influence Code scale, only 6 participants (combined) fell on the most and least rural extremes of the scale. The same pattern was true for participants classified by the Index of Relative Rurality. Therefore, there was not an opportunity to compare prevalence rates at each level of the six rural definitions.

Another reason that differences in PSC score were not found between levels of rurality could be that the entire region of study is underserved in terms of pediatric mental health providers (Hendryx, 2008; Polaha et al., 2011). Few pediatric psychologists practice in this region, regardless of rural or urban location. This leaves parents the option of possibly being on a long waiting list for weeks to get their child services in a community mental health setting, if one exists. Similarities in pediatric mental health provider shortages across rural and urban Appalachian settings may be one reason prevalence rates of clinically significant child psychosocial concerns do not differ between levels of rurality.

A third explanation relates to the specific methods used in this study. Participants reported their county and zip code of residence and these data were used to determine rural status based on the six definitions used in the study. It is possible that a more precise measure of

geographic location, such as the census tract, would have allowed for more accurate coding of rural status as defined by the U.S. Census, RUCA, and the Index of Relative Rurality.

In addition, although a national study of the PSC by Jellinek et al. (1999) used parental education as a proxy for SES, other studies such as the Health and Wellbeing of Children in Rural Areas report by the HHS based SES on family income. Collecting family income along with parental education level may have allowed for a more in-depth analysis of how SES relates to rurality and child psychosocial concerns.

A fourth explanation of the results of the present study can be conceptualized in terms of Bronfenbrenner's ecological model (Bronfenbrenner, 1994). The model considers the development of child psychosocial problems as being dependent on several progressively broader levels of influence in the child's environment, including microsystems, mesosystmes, exosystmes, and macrosystems (Bronfenbrenner, 1994). A lack of relationship between rurality and PSC score may be because rurality, as a contextual factor on the exo- or macrosystem level, has a less direct relationship to children's psychosocial concerns than the microsystem-level influence of parental education that may influence the child more on a daily basis.

Despite documented health disparities and barriers to care, rural participants in the present study had PSC scores that did not differ significantly from less rural participants. Additionally, the sample as a whole, which came from a largely underserved area, did not differ from national findings. However, one possibility could be that poverty, barriers to care, and other health disparities actually do have a more pronounced effect on rural residents than urban residents in the general population, but that effect was not measured in this study because every child that data were collected on was actually able to make it to a primary care appointment, a task that may not be possible of everyone living in a rural area. It may be that children with the

worst behavior problems in rural areas are not as well represented in primary care due to barriers such as lack of transportation, poverty, and low parental education.

Future Studies

Although the present study did not find significant differences in PSC scores between different measures of rurality, researchers should not assume that the type of rural definition used in future studies does not matter. On the contrary, researchers should be explicit about which rural definition they employ and understand the limitations of any definition they choose. Future studies should also seek to obtain the most precise geographical unit possible when determining rural status as well as consider the theoretical rationale for choosing a particular definition.

The present study as well as other studies have shown that prevalence rates of child psychosocial problems are at least as high in rural primary care clinics as they are anywhere else. Yet, services are less available in rural areas. More research is needed to determine how rural families deal with the need for mental health services. If people are not seeking care in a primary care setting, where are they going? Where would they prefer to go? In addition to more research, innovative service delivery mechanisms such as integrated care are needed to address the already high demand for child mental health services in the primary care setting.

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APPENDICES

APPENDIX A: Demographic Questionnaire

Please answer these questions about the child you brought to the clinic today.

Child's Age: _____ Child's Date of Birth:_____ Child Sex: ___Male
___ Female

Your relationship to the child:
_____Mother
_____Father
_____Other: (specify) _____

What county do you live in? _____ Zip Code: _____

Which of the following racial/ethnic groups best describes you? (please check one box)

□ White (Caucasian) □ White Hispanic □ Black (African American)
□ Black Hispanic □ Asian/Pacific Islander □ Native American
□ Other (Please specify): _____

Father/Step-father's highest grade completed:
_____ does not apply
_____ did not complete high school
_____ high school
_____ 2-year college or technical school
_____ 4-year college
_____ post college degree

Mother/Step-mother's highest grade completed:
_____ does not apply
_____ did not complete high school
_____ high school
_____ 2-year college or technical school
_____ 4-year college
_____ post college degree

Have you ever talked about concerns you have for your child with any of the following people? Check all that apply.
____my child's teacher
____our pastor or minister at church
____close family members or friends
____my child's doctor
____a counselor or therapist
_____other: _____

Some people who fill in this form may be able to take part in the second part of this study. That part is longer but you would be paid for your time. Can we call you about that study? If yes, please tell us your name and telephone number:

_____ _____ _____
Parent Name ***Telephone Number*** ***email address***

Thank you for filling out this form. Please put it in the attached envelope, seal it, and place in the drop box in the waiting room. Remember, no one in this clinic can read your answers. Envelopes will be opened only by ETSU study staff.

APPENDIX B: Pediatric Symptom Checklist

Please place a mark under the heading that best describes **the child you have brought to the clinic today**.

		Never	**Sometimes**	**Often**
1.	Complains of aches and pains			
2.	Spends more time alone			
3.	Tires easily, has little energy			
4.	Fidgety, unable to sit still			
5.	Has trouble with teacher			
6.	Less interested in school			
7.	Acts as if driven by motor			
8.	Daydreams too much			
9.	Distracted easily			
10.	Is afraid of new situations			
11.	Feels sad, unhappy			
12.	Is irritable, angry			
13.	Feels hopeless			
14.	Has trouble concentrating			
15.	Less interested in friends			
16.	Fights with other children			
17.	Absent from school			
18.	School grades dropping			
19.	Is down on him or herself			
20.	Visits the doctor with doctor finding nothing wrong			
21.	Has trouble sleeping			
22.	Worries a lot			
23.	Wants to be with you more than before			
24.	Feels he or she is bad			
25.	Takes unnecessary risks			
26.	Gets hurt frequently			
27.	Seems to be having less fun			
28.	Acts younger than children his or her age			
29.	Does not listen to rules			
30.	Does not show feelings			
31.	Does not understand other people’s feelings			
32.	Teases others			
33.	Blames others for his or her troubles			
34.	Takes things that don’t belong to him or her			
35.	Refuses to share			

APPENDIX C: TABLES

Table 1

Demographic Characteristics

Variable	Frequency	%	
Age (years)			
Mean ± SD			8.73 ± 3.46
Range			4-16
Gender, n (%)			
Male	1358	50.8	
Female	1300	48.7	
Race/Ethnicity, n (%)			
Majority (White)	2474	92.6	
Minority	185	6.9	
Screening Respondent, n (%)			
Mother	2068	77.4	
Father	305	11.4	
Other	294	11.0	
Highest grade of parent education, n (%)			
Mother			
Does not apply	36	1.3	
Did not complete high school	211	7.9	
Completed high school	1019	38.1	
Two years of college	714	26.7	
Four years of college	395	14.8	
Post college	203	7.6	
Father			
Does not apply	127	4.8	
Did not complete high school	309	11.6	
Completed high school	1236	46.3	
Two years of college	493	18.5	
Four years of college	268	10.0	
Post college	169	6.3	
Rural Status, n (%)			
U.S. Census definition			
U.S. Census			
Urban Area	370	13.8	
Urban Cluster	327	12.2	
Rural	1921	71.9	
U.S. Census - Condensed			
Urban	697	26.1	
Rural	1921	71.9	
Office of Management and Budget			

Table 1, continued

Variable	Frequency	%
CBSA		
Metropolitan	1658	62.1
Micropolitan	25	.9
Noncore (rural)	961	36.0
CBSA - condensed		
Metropolitan	1658	62.1
Nonmetropolitan	986	36.9
Rural Urban Continuum Codes (RUCC)		
RUCC		
1	1	.0
2	3	.1
3	1654	61.9
4	0	.0
5	0	.0
6	589	22.0
7	260	9.7
8	40	1.5
9	97	3.6
RUCC - Condensed		
Less rural (codes 1-3)	1658	62.1
More rural (codes 4-9)	986	36.9
Rural Urban Commuting Areas (RUCA)		
Categorization A		
Isolated small rural town	426	15.9
Small rural town	977	36.6
Large rural city/town	142	5.3
Urban	1077	40.3
Categorization B		
Small and isolated small rural town	1403	52.5
Large rural city/town	142	5.3
Urban	1077	40.3
Categorization C		
Rural	1545	57.8
Urban	1077	40.3
Urban Influence Codes (UIC)		
UIC		
1	1	.0
2	1606	60.1
3	0	.0
4	0	.0
5	62	2.3
6	547	20.5

Table 1, continued

Variable	Frequency	%
7	76	2.8
8	14	.5
9	1	.0
10	4	.1
11	249	9.3
12	84	3.1
UIC – Condensed		
More rural (UIC 2)	1037	38.8
Less rural (UIC 5-8, 11, 12)	1607	60.1
Index of Relative Rurality (IRR)		
< 0.1	0	.0
0.1 – 0.19	4	.1
0.2 – 0.29	479	17.9
0.3 – 0.39	237	8.9
0.4 – 0.49	1188	44.5
0.5 – 0.59	597	22.3
0.6 – 0.69	136	5.1
0.7 – 0.79	0	.0
0.8 – 0.89	0	.0
>.89	0	.0

Table 2

Psychosocial Concerns Across Demographic Characteristics, Measures of SES, and Measures of Rurality

Variable	Frequency	PSC total score (M±SD)	PSC score for preschool aged (M±SD)	PSC score for school aged (M±SD)
Overall		14.93 ± 10.70	12.14 ± 8.45	15.71 ± 11.13
Gender				
Male	1358	16.06 ± 10.80	12.95 ± 8.84	16.96 ± 11.14
Female	1300	13.79 ± 10.48	11.33 ± 7.93	14.46 ± 10.97
Race/ethnicity				
Majority (White)	2474	14.99 ± 10.77	12.20 ± 8.60	15.75 ± 11.17
Minority	185	14.02 ± 9.83	11.28 ± 6.51	15.03 ± 10.65
Screening Respondent				
Mother	2068	14.57 ± 10.55	11.93 ± 8.34	15.34 ± 11.00
Father	305	13.54 ± 9.81	10.81 ± 7.06	14.23 ± 10.28
Other	294	19.17 ± 11.71	15.53 ± 9.41	19.88 ± 12.01
Highest grade of parent education				
Mother				
Does not apply	36	18.19 ± 11.47	11.40 ± 4.04	19.50 ± 12.01
Did not complete high school	211	18.61 ± 11.32	15.02 ± 9.31	19.52 ± 11.63
Completed high school	1019	15.75 ± 10.79	13.55 ± 8.79	16.38 ± 11.23
Two year of college	714	15.20 ± 10.85	10.96 ± 7.66	16.52 ± 11.35
Four years of college	395	11.98 ± 9.02	10.89 ± 8.54	12.24 ± 9.12
Post college	203	11.27 ± 9.04	9.68 ± 7.28	11.73 ± 9.46
Father				
Does not apply	127	19.48 ± 11.68	15.39 ± 9.51	20.92 ± 12.08
Did not complete high school	309	17.93 ± 11.84	14.37 ± 9.63	18.80 ± 12.18
Completed high school	1236	15.40 ± 10.54	12.67 ± 8.87	16.17 ± 10.85
Two year of college	493	13.58 ± 10.53	10.78 ± 6.56	14.38 ± 11.29
Four years of college	268	11.85 ± 9.43	10.24 ± 7.67	12.24 ± 9.77
Post college	169	11.06 ± 7.82	9.19 ± 6.47	11.70 ± 8.15

Table 2, continued

Variable	Frequency	PSC total score (M±SD)	PSC score for preschool aged (M±SD)	PSC score for school aged (M±SD)
Rural status				
U.S. Census definition				
U.S. Census				
Urban Area	370	15.43 ± 11.07	11.61 ± 8.37	16.64 ± 11.55
Urban Cluster	327	15.60 ± 11.82	12.87 ± 8.77	16.44 ± 12.51
Rural	1921	14.60 ± 10.37	12.11 ± 8.45	15.29 ± 10.73
U.S. Census – Condensed				
Urban	697	15.51 ± 11.42	12.20 ± 8.56	16.54 ± 12.00
Rural	1921	14.60 ±10.37	12.11 ± 8.45	15.29 ± 10.73
Office of Management and Budget				
CBSA				
Metropolitan	1658	14.91 ± 10.50	13.06 ± 8.81	15.38 ± 10.83
Micropolitan	25	15.52 ± 10.67	4.00 ± 1.16	17.71 ± 10.24
Noncore (rural)	961	14.87 ± 11.07	11.10 ± 7.84	16.10 ± 11.68
CBSA – Condensed				
Metropolitan	1658	14.91 ± 10.50	13.06 ± 8.81	15.38 ± 10.83
Nonmetropolitan	986	14.88 ± 11.05	10.98 ± 7.83	16.15 ± 11.64
Rural Urban Continuum Codes (RUCC)				
RUCC				
1	1	8.00 ± .0	8.00 ± .0	--
2	3	10.67 ± 7.23	--	10.67 ± 7.23
3	1654	14.92 ± 10.50	13.07 ± 8.82	15.39 ± 10.84
4	0	--	--	--
5	0	--	--	--
6	589	14.88 ± 10.70	12.34 ± 8.26	15.73 ± 11.27
7	260	15.85 ± 12.23	9.67 ± 7.46	17.49 ± 12.73
8	40	13.51 ± 9.13	8.09 ± 4.81	16.00 ± 9.63
9	97	12.75 ± 10.28	7.63 ± 5.39	14.91 ± 11.10

Table 2, continued

Variable	Frequency	PSC total score (M±SD)	PSC score for preschool aged (M±SD)	PSC score for school aged (M±SD)
RUCC – Condensed				
Less rural (codes 1-3)	1658	14.91 ± 10.50	13.06 ± 8.81	15.38 ± 10.83
More rural (codes 4-9)	986	14.88 ± 11.05	10.98 ± 7.83	16.15 ± 11.64
Rural Urban Commuting Areas (RUCA)				
Categorization A				
Isolated small rural town	426	14.28 ± 10.31	10.92 ± 7.93	15.48 ± 10.80
Small rural town	977	15.00 ± 11.16	11.61 ± 8.14	15.83 ± 11.63
Large rural city/town	142	14.49 ± 9.98	14.07 ± 8.92	14.61 ± 10.29
Urban	1077	15.01 ± 10.47	12.84 ± 8.86	15.65 ± 10.82
Categorization B				
Small and isolated small rural town	1403	14.78 ± 10.91	11.36 ± 8.05	15.73 ± 11.40
Large rural city/town	142	14.49 ± 9.98	14.07 ± 8.92	14.61 ± 10.29
Urban	1077	15.01 ± 10.47	12.84 ± 8.86	15.65 ± 10.82
Categorization C				
Rural	1545	14.76 ± 10.82	11.62 ± 8.16	15.62 ± 11.30
Urban	1077	15.01 ± 10.47	12.84 ± 8.86	15.65 ± 10.82
Urban Influence Codes (UIC)				
UIC				
1	1	8.00 ± .0	8.00 ± .0	--
2	1606	14.91 ± 10.43	12.84 ± 8.69	15.42 ± 10.77
3	0	--	--	--
4	0	--	--	--
5	62	14.90 ± 11.01	17.46 ± 10.85	14.17 ± 11.06
6	547	14.84 ± 10.80	12.46 ± 8.32	15.66 ± 11.42
7	76	13.55 ± 9.41	8.42 ± 5.30	15.50 ± 9.92
8	14	16.93 ± 15.23	7.00 ± 8.68	20.90 ± 15.77
9	1	8.00 ± .0	8.00 ± .0	--
10	4	8.00 ± 6.68	3.00 ± .0	9.67 ± 7.10
11	249	15.91 ± 12.21	9.98 ± 7.56	17.46 ± 12.72
12	84	13.44 ± 10.60	8.14 ± 5.72	15.52 ± 11.37

Table 2, continued

Variable	Frequency	PSC total score (M±SD)	PSC score for preschool aged (M±SD)	PSC score for school aged (M±SD)
UIC – Condensed				
More rural	1037	14.90 ± 11.12	11.37 ± 8.15	16.05 ± 11.72
Less rural	1607	14.90 ± 10.43	12.83 ± 8.68	15.42 ± 10.77
Index of Relative Rurality (IRR)				
< 0.1	0			
0.1 – 0.19	4	10.00 ± 6.06	8.00 ± .0	10.67 ± 7.23
0.2 – 0.29	479	15.02 ± 10.57	11.45 ± 8.77	16.01 ± 10.82
0.3 – 0.39	237	13.90 ± 9.95	13.00 ± 8.96	14.18 ± 10.25
0.4 – 0.49	1188	15.32 ± 10.96	12.94 ± 8.65	15.87 ± 11.37
0.5 – 0.59	597	14.88 ± 10.74	12.57 ± 8.22	15.62 ± 11.34
0.6 – 0.69	136	12.96 ± 9.99	7.76 ± 5.17	15.23 ± 10.73
0.7 – 0.79	0	--	--	--
0.8 – 0.89	0	--	--	--
>.89	0	--	--	--

Table 3

t-tests of Psychosocial Concerns Across Demographic and Categorical Rurality Variables

	All Ages			School Aged (6-16)			Preschool (4-5)		
Predictor Variables	PSC score (M ± SD)	*t*-test	*df*	PSC score (M ± SD)	*t*-test	*df*	PSC score (M ± SD)	*t*-test	*df*
Age		8.13***	1138.04						
Preschool	12.14 ± 8.45								
School aged	15.71 ± 11.13								
Gender		-5.37***	2522.88		-5.02***	1972		-2.26*	549
Male	16.06 ± 10.80			16.96 ± 11.14			12.95 ± 8.84		
Female	13.79 ± 10.48			14.46 ± 10.97			11.33 ± 7.93		
Race/ethnicity		1.23	200.83		.70	1970		.89	60.31
Majority	14.99 ± 10.77			15.75 ± 11.17			12.20 ± 8.60		
Minority	14.02 ± 9.83			15.03 ± 10.65			11.28 ± 6.51		
Rural Status									
U.S. Census - Condensed		-1.80	1095.25		-2.09*	815.58		-.12	547
Urban	15.51 ± 11.42			16.54 ± 12.00			12.20 ± 8.56		
Rural	14.60 ±10.37			15.29 ± 10.73			12.11 ± 8.45		
CBSA – Condensed		-.06	2505		1.48	1959		-2.90**	522.81
Metropolitan	14.91 ± 10.50			15.38 ± 10.83			13.06 ± 8.81		
Nonmetro	14.88 ± 11.05			16.15 ± 11.64			10.98 ± 7.83		
RUCC – Condensed		-.06	2505		1.48	1959		-2.90**	522.81
More rural	14.91 ± 10.50			15.38 ± 10.83			13.06 ± 8.81		
Less rural	14.88 ± 11.05			16.15 ± 11.64			10.98 ± 7.83		
RUCA – Cat C		-.59	2485		-.05	1936		-1.67	547
Urban	15.01 ± 10.47			15.65 ± 10.82			12.84 ± 8.86		
Rural	14.76 ± 10.82			15.62 ± 11.30			11.62 ± 8.16		
UIC - Condensed		0.14	2505		-1.19	1466.4		2.00*	544
More rural	14.90 ± 11.12			16.05 ± 11.72			11.37 ± 8.15		
Less rural	14.90 ± 10.43			15.42 ± 10.77			12.83 ± 8.68		

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

Table 4

*Average PSC Score by Clinic**

Clinic	**All Ages**			**Ages 4-5**			**Ages 6-16**		
	N	M	*SD*	N	M	*SD*	N	M	*SD*
Rogersville	555	**15.51**	*10.87*	78	**12.77**	*7.73*	477	**15.96**	*11.24*
Marion	519	**15.01**	*11.04*	129	**12.43**	*8.52*	390	**15.86**	*11.64*
Bristol	48	**17.54**	*10.27*	22	**15.55**	*9.15*	26	**19.23**	*11.02*
Johnson City	338	**16.30**	*10.50*	75	**12.05**	*10.03*	263	**17.51**	*10.34*
Elizabethton	246	**12.92**	*9.63*	57	**11.95**	*8.12*	189	**13.22**	*10.05*
Norton	341	**15.06**	*11.64*	79	**9.35**	*6.74*	262	**16.78**	*12.25*
Gray	146	**13.26**	*9.93*	24	**10.92**	*6.71*	122	**13.72**	*10.41*
Abingdon	339	**14.17**	*9.94*	88	**13.35**	*8.92*	251	**14.46**	*10.27*
Total	**2532**	**14.93**	***10.70***	**552**	**12.14**	***8.45***	**1980**	**15.71**	***11.13***

*excludes missing cases

Table 5

Prevalence of Clinically Significant Psychosocial Concerns Across Demographic Characteristics, Measures of SES, and Measures of Rurality

Variable	Frequency	Prevalence (all ages)	Chi Square
Overall	2532	14.5	
Age			**10.78****
Preschool (4-5)	553	10.1	-Preschool lower
School Aged (6-16)	1979	15.7	
Gender			**13.58*****
Male	1358	17.0	-Male higher
Female	1300	11.9	
Race/ethnicity			**.71**
Majority (White)	2474	14.6	
Minority	185	12.3	
Screening Respondent			**23.10*****
Mother	2068	13.8	-"Other" higher
Father	305	10.3	
Other	294	23.8	
Highest grade of parent education			
Mother			**48.79*****
Does not apply	36	25.8	-"DNCHS" higher
Did not complete high school	211	24.6	-4 yr college, post college lower
Completed high school	1019	16.2	
Two year of college	714	14.6	
Four years of college	395	7.4	
Post college	203	6.2	
Father			**64.97*****
Does not apply	127	26.1	-DNA, DNCHS higher
Did not complete high school	309	24.2	-2yr, 4yr, post college lower
Completed high school	1236	15.4	
Two year of college	493	10.3	
Four years of college	268	6.5	
Post college	169	6.1	
Rural status			
U.S. Census definition			
U.S. Census			**7.62****
Urban Area	370	17.1	

Table 5, continued

Variable	Frequency	Prevalence	Chi Square
Urban Cluster	327	17.9	
Rural	1921	13.2	
U.S. Census – Condensed			**7.54****
Urban	697	17.5	-Urban higher
Rural	1921	13.2	
Office of Management and Budget			
CBSA			**.17**
Metropolitan	1658	14.7	
Micropolitan	25	12.0	
Noncore (rural)	961	14.3	
CBSA – Condensed			**.07**
Metropolitan	1658	14.3	
Nonmetropolitan	986	14.7	
Rural Urban Continuum Codes (RUCC)			**5.01**
RUCC			
1	1	0	
2	3	0	
3	1654	14.7	
4	0	--	
5	0	--	
6	589	14.7	
7	260	16.1	
8	40	5.7	
9	97	9.9	
RUCC – Condensed			**.07**
Less rural (codes 1-3)	1658	14.3	
More rural (codes 4-9)	986	14.7	
Rural Urban Commuting Areas (RUCA)			
Categorization A			**1.40**
Isolated small rural town	426	13.0	
Small rural town	977	14.8	
Large rural city/town	142	12.2	
Urban	1077	14.8	
Categorization B			**.68**
Small and isolated small rural town	1403	14.2	

Table 5, continued

Variable	Frequency	Prevalence	Chi Square
Large rural city/town	142	12.2	
Urban	1077	14.8	
Categorization C			**.27**
Rural	1545	14.1	
Urban	1077	14.8	
Urban Influence Codes (UIC)			
UIC			**7.07**
1	1	0	
2	1606	14.6	
3	0	--	
4	0	--	
5	62	13.6	
6	547	15.3	
7	76	5.8	
8	14	21.4	
9	1	0	
10	4	0	
11	249	16.0	
12	84	11.5	
UIC – Condensed			**.02**
More rural	1037	14.6	
Less rural	1607	14.4	
Index of Relative Rurality (IRR)			**5.18**
< 0.1	0	--	
0.1 – 0.19	4	0	
0.2 – 0.29	479	15.1	
0.3 – 0.39	237	12.7	
0.4 – 0.49	1188	15.1	
0.5 – 0.59	597	15.1	
0.6 – 0.69	136	8.8	
0.7 – 0.79	0	--	
0.8 – 0.89	0	--	
>.89	0	--	

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

Table 6

*Prevalence of Clinically Significant Psychosocial Concerns by Clinic**

	All Ages			Ages 4-5 (PSC above 24)			Ages 6-16 (PSC above 28)		
	Significant		**Total**	**Significant**		**Total**	**Significant**		**Total**
	N	%	N	N	%	N	N	%	N
Rogersville	90	**16.2**	555	8	**10.3**	78	82	**17.2**	477
Marion	83	**16.0**	519	15	**11.6**	129	68	**17.4**	390
Bristol	10	**20.8**	48	4	**18.2**	22	6	**23.1**	26
Johnson City	56	**16.6**	338	12	**15.8**	76	44	**16.8**	262
Elizabethton	27	**11.0**	246	6	**10.5**	57	21	**11.1**	189
Norton	47	**13.8**	341	2	**2.5**	79	45	**17.2**	262
Gray	16	**11.0**	146	0	**0**	24	16	**13.1**	122
Abingdon	38	**11.2**	339	9	**10.2**	88	29	**11.6**	251
Total	**367**	**14.5**	**2532**	**56**	**10.1**	**553**	**311**	**15.7**	**1979**

*excludes missing cases

Table 7

Simultaneous Regression Analysis Summary for U.S. Census Definition of Rurality Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
Rural (constant)	14.60	.25		15.29	.29		12.11	.43	
Urban Area	.83	.62	.03	1.35	.74	.04	-.50	1.02	-.02
Urban Cluster	1.00	.65	.03	1.15	.77	.03	.76	1.07	.03

Note. [a] Adj. R^2 = .001; [b] Adj. R^2 = .001; [c] Adj. R^2 = -.002; *p < .05

Table 8

Simultaneous Regression Analysis Summary for U.S. Census Definition of Rurality – Condensed Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
Rural (constant)	14.60	.25		15.29	.29		12.11	.43	
Urban	.91	.48	.04	1.26	.57	.05*	.10	.80	.01

Note. [a] Adj. R^2 = .001; [b] Adj. R^2 = .002*; [c] Adj. R^2 = -.002; *$p < .05$

Table 9

Simultaneous Regression Analysis Summary for CBSA - Condensed Definition of Rurality Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
Nonmetropolitan (constant)	14.88	.35		16.15	.42		10.98	.56	
Metropolitan	.03	.44	.00	-.77	.52	-.03	2.08	.73	.12**

Note. [a] Adj. R^2 = .000; [b] Adj. R^2 = .001; [c] Adj. R^2 = .013**; *p < .05, **p <.01

Table 10

Simultaneous Regression Analysis Summary for RUCC Definition of Rurality Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
RUCC 9 (constant)	12.63	1.10		14.72	1.36		7.64	1.58	
RUCC 8	0.88	2.12	0.01	1.28	2.65	0.01	0.45	2.97	0.01
RUCC 7	3.22	1.29	0.09	2.78	1.57	0.07	2.03	1.96	0.07
RUCC 6	2.25	1.19	0.09	1.01	1.46	0.04	4.69	1.73	0.24*
RUCC 3	2.29	1.13	0.10	0.67	1.40	0.03	5.43	1.65	0.32**

Note. [a] Adj. R^2 = .001; [b] Adj. R^2 = .001; [c] Adj. R^2 = .027**; *p < .05, **p < .01

Table 11

Simultaneous Regression Analysis Summary for RUCC - Condensed Definition of Rurality Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
More rural (constant)	14.88	.35		16.15	.42		10.98	.56	
Less rural	.03	.44	.00	-.77	.52	-.03	2.08	.73	.12**

Note. [a] Adj. R^2 = .000 ; [b] Adj. R^2 = .001; [c] Adj. R^2 = .013**; *p < .05

Table 12

Simultaneous Regression Analysis Summary for RUCA – "Categorization A" Definition of Rurality Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
Isolated small rural town (constant)	14.28	.53		15.48	.65		10.93	.82	
Small rural town	.73	.64	.03	.34	.77	.02	.69	1.03	.04
Large rural city/town	.21	1.05	.01	-.88	1.25	-.02	3.14	1.75	.08
Urban	.74	.63	.03	.17	.76	.01	1.92	.99	.11

Note. [a] Adj. R^2 = -.001; [b] Adj. R^2 = -.001; [c] Adj. R^2 = .006; *p < .05

Table 13

Simultaneous Regression Analysis Summary for RUCA – "Categorization B" Definition of Rurality Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
Small & isolated small rural town (constant)	14.78	.29		15.73	.34		11.36	.50	
Large rural city/town	-.30	.95	-.01	-1.12	1.12	-.02	2.71	1.62	.07
Urban	.23	.45	.01	-.08	.52	-.00	1.48	.75	.09

Note. [a] Adj. R^2 = -.001; [b] Adj. R^2 = -.001; [c] Adj. R^2 = .007; *p < .05

Table 14

Simultaneous Regression Analysis Summary for RUCA – "Categorization C" Definition of Rurality Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
Rural (constant)	14.76	.28		15.62	.33		11.62	.48	
Urban	.26	.44	.01	.03	.51	.00	1.23	.73	.07

Note. [a] Adj. R^2 = .000; [b] Adj. R^2 = -.001; [c] Adj. R^2 = .003; *p < .05

Table 15

Simultaneous Regression Analysis Summary for UIC Definition of Rurality Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
UIC 12 (constant)	13.05	1.17		15.22	1.45		7.92	1.67	
UIC 11	2.86	1.36	0.08	2.24	1.66	0.06	2.06	2.05	0.07
UIC 8	3.88	3.09	0.03	5.68	3.81	0.04	-0.92	4.49	0.00
UIC 7	0.50	1.74	0.01	0.28	2.14	0.00	0.50	2.54	0.01
UIC 6	1.80	1.26	0.07	0.44	1.55	0.02	4.54	1.82	0.23**
UIC 5	1.85	1.82	0.03	-1.05	2.19	-0.01	9.54	2.85	0.17**
UIC 2	1.86	1.20	0.08	0.20	1.48	0.01	4.92	1.74	0.29**

Note. [a] Adj. R^2 = .000; [b] Adj. R^2 = .001; [c] Adj. R^2 = .030**; *p < .05, **p < .01

Table 16

Simultaneous Regression Analysis Summary for UIC - Condensed Definition of Rurality Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
More rural (constant)	14.90	0.27		15.42	0.32		12.83	0.49	
Less rural	0.00	0.44	0.00	0.63	0.52	0.03	-1.45	0.73	-0.09*

Note. [a] Adj. R^2 = .000; [b] Adj. R^2 = .000; [c] Adj. R^2 = .005*; *p < .05

Table 17

Simultaneous Regression Analysis Summary for IRR Definition of Rurality Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
Constant	15.40	0.97		15.74	1.16		13.13	1.61	
Index of Relative Rurality	-1.14	2.20	-0.01	-0.20	2.62	0.00	-2.10	3.57	-0.03

Note. [a] Adj. R^2 = .000; [b] Adj. R^2 = .000; [c] Adj. R^2 = -.001; *p < .05

Table 18

Simultaneous Regression Analysis Summary for Maternal Education Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
Post College (constant)	11.27	0.75		11.73	0.88		9.68	1.25	
4 yr college	0.72	0.92	0.02	0.51	1.08	0.02	1.21	1.60	0.05
2 yr college	3.93	0.85	0.17***	4.79	1.00	0.19***	1.28	1.41	0.07
High School	4.48	0.82	0.21***	4.65	0.97	0.20***	3.87	1.38	0.22**
Did not complete HS	7.35	1.06	0.19***	7.79	1.23	0.19***	5.34	1.82	0.17***
Does not apply	6.93	2.03	0.07***	7.77	2.31	0.08***	1.72	3.93	0.02

Note. [a] Adj. R^2 = .033***; [b] Adj. R^2 = .038***; [c] Adj. R^2 = .036**; *p < .05, **p < .01, ***p < .001

Table 19

Simultaneous Regression Analysis Summary for Paternal Education Predicting PSC Score

	PSC Score - All Ages[a]			PSC Score - School Aged[b]			PSC Score – Preschool[c]		
Predictor Variables	B	SEB	β	B	SEB	β	B	SEB	β
Post College (constant)	11.06	0.82		11.70	0.98		9.19	1.28	
4 yr college	0.79	1.04	0.02	0.54	1.24	0.02	1.05	1.74	0.04
2 yr college	2.52	0.95	0.09*	2.68	1.14	0.09*	1.59	1.52	0.07
High School	4.34	0.87	0.20***	4.47	1.05	0.20***	3.48	1.38	0.21*
Did not complete HS	6.87	1.03	0.21***	7.10	1.22	0.21***	5.18	1.70	0.19**
Does not apply	8.42	1.26	0.17***	9.22	1.52	0.17***	6.20	1.97	0.17**

Note. [a] Adj. R^2 = .037***; [b] Adj. R^2 = .038***; [c] Adj. R^2 = .028***; *p < .05, **p < .01, ***p < .001

Table 20

Moderated Regression Analysis Summary for Variables Predicting PSC Scores

		All Ages		
	Predictors	B	SE	β
1	Constant	9.55	0.63	
	Child Age	0.47	0.06	0.15***
	Child Sex	2.43	0.43	0.11***
2	Constant	3.93	1.48	
	Child Age	0.44	0.06	0.14***
	Child Sex	2.45	0.42	0.12***
	UIC 11	2.89	1.34	0.08*
	UIC 8	3.98	2.98	0.03
	UIC 7	0.49	1.70	0.01
	UIC 6	2.22	1.24	0.08
	UIC 5	1.95	1.80	0.03
	UIC 2	1.97	1.18	0.09
	Mother edu – 4 yr college	1.00	0.92	0.03
	Mother edu – 2 yr college	4.16	0.85	0.18***
	Mother edu – High School	4.71	0.82	0.22***
	Mother edu - DNCHS	7.42	1.05	0.19***
	Mother edu - DNA	7.27	2.00	0.08***
3	Constant	-2.22	10.28	
	Child Age	0.44	0.06	0.14***
	Child Sex	2.41	0.42	0.11***
	UIC 11	9.65	10.57	0.26
	UIC 8	14.25	14.53	0.10
	UIC 7	3.35	11.87	0.05
	UIC 6	8.82	10.40	0.34
	UIC 5	3.80	11.10	0.05
	UIC 2	8.18	10.32	0.37
	Mother edu – 4 yr college	4.80	10.66	0.16
	Mother edu – 2 yr college	11.82	10.47	0.50
	Mother edu – High School	10.92	10.44	0.50
	Mother edu - DNCHS	12.88	10.83	0.33
	Mother edu - DNA	7.03	2.26	0.07**
	DNCHS X UIC 2	-5.54	10.90	-0.12
	HS X UIC 2	-6.09	10.49	-0.24

2yr X UIC 2	-8.15	10.52	-0.28
4yr X UIC 2	-3.66	10.73	-0.10
DNCHS X UIC 5	-3.25	12.70	-0.01
HS X UIC 5	0.09	11.48	0.00
2yr X UIC 5	-3.04	11.51	-0.03
4yr X UIC 5	-1.98	12.34	0.00
DNA X UIC 6	8.98	6.54	0.03
DNCHS X UIC 6	-2.43	11.18	-0.02
HS X UIC 6	-6.19	10.58	-0.17
2yr X UIC 6	-9.14	10.62	-0.21
4yr X UIC 6	-5.16	10.85	-0.08
DNCHS X UIC 7	-0.38	12.87	0.00
HS X UIC 7	-2.95	12.21	-0.03
2yr X UIC 7	-5.38	12.20	-0.05
4yr X UIC 7	2.81	12.81	0.01
DNCHS X UIC 8	-24.69	18.13	-0.05
HS X UIC 8	-13.77	15.24	-0.06
2yr X UIC 8	-4.29	15.38	-0.02
4yr X UIC 8	-13.91	18.02	-0.03
DNA X UIC 11	-8.11	6.82	-0.03
DNCHS X UIC 11	-9.35	11.40	-0.07
HS X UIC 11	-9.80	10.79	-0.16
2yr X UIC 11	-4.67	10.83	-0.07
4yr X UIC 11	-3.37	11.07	-0.04

Note. *p<.05, **p<.01, ***p<.001; Adj. R^2_1= .034***, Adj. R^2_2= .066***, Adj. R^2_3= .071***; Subscripts refer to model number; Reference group: School aged (6-16) females living in a county designated with a UIC code of 12, and with mothers who have a post college education.

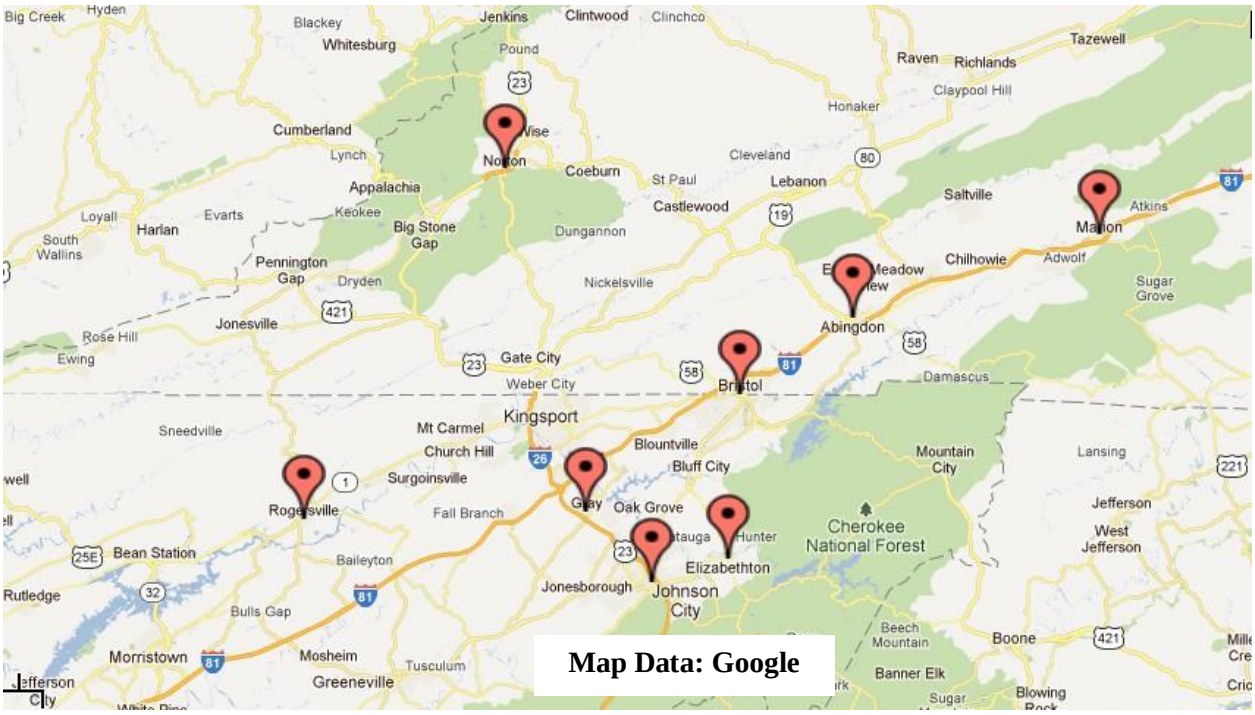

Figure 1. Locations of eight primary care clinics in Tennessee and Virginia where data were collected for this study.

VITA

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