Final Report

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INFANCY TO MIDDLE CHILDHOOD IN RURAL APPALACHIA
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I. Introduction

A. Nature of the Research Problem

Low socio-economic status (SES) has been well documented as a general risk factor for children's development. Specifically, school-age children in low-SES families are more likely, on average, to have behavior problems, to experience academic difficulty, and to use tobacco than children in families where parents have higher levels of income and education. However, these risks and outcomes have most often been studied in urban than rural children and in cultural or ethnic groups other than White Appalachian.

B. Purpose, Scope, and Methods of the Investigation

The purpose of the present research was continued investigation, into middle childhood, of an under-studied, but high-risk group, low-SES rural Appalachian children. This research built on two prior projects, also funded by the Maternal and Child Health Bureau Research Program, which studied the socioemotional and cognitive development of low-income rural Appalachian children in infancy and in the period of preschool through kindergarten. Obtaining middle childhood data on social adjustment, academic achievement, and attitudes toward tobacco was important to better understand both risk and protective factors and to inform future policy-making decisions.

The conceptual framework for this research involved investigating individual differences in socioemotional and cognitive development with a contextual model (Belsky, 1984) and a focus on risk and protective factors at both the child and family level. Children and parents were assessed with videotaped parent-child interaction, questionnaires orally administered to children and parents, standardized tests of children's language skills and nonverbal intelligence, parent interviews, and data obtained from teachers and schools.

C. Nature of the Findings

Middle childhood group findings include: 1) scores significantly below means on standardized assessments of language and nonverbal intelligence, 2) high rates of repeating grades and receipt of special services at school, 3) high rates of parent-rated behavior problems, 4) generally positive (i.e., not endorsing use) attitudes toward tobacco at this age, and 5) significant connections between academic and behavioral outcomes and between academic competence and tobacco attitudes.

Analyses related to predicting individual differences and to assessing the effects of risk and protective factors show that: 1) risks appear to be better predictors than protective factors; 2) kindergarten assessments are strong predictors of middle childhood achievement and social behavior; 3) preschool language skills and school age attention problems relate to both cognitive and behavioral

development; and 4) few variables were significantly related to tobacco attitudes/behavior at this age.

II. Review of the Literature

Recent data from Save the Children puts the number of rural poor children at 2.5 million and recognizes central Appalachia as a region of persistent severe poverty. In West Virginia, the only state entirely within the Appalachian region, Census Bureau figures show a 30% child poverty rate, higher than 47 other states. In addition, more West Virginia children live with parents who do not have full-time, year-round employment than in any other state (Casey Foundation, 2002) and an estimated 20% of West Virginia adults have level 1 literacy skills, the lowest level (West Virginia Adult Basic Education, 2001).

Relative to other children, low-SES school-aged children have higher rates of aggressive behavior (Schwartz, Dodge, Pettit, & Bates, 1997; Strassberg, Dodge, Pettit, & Bates, 1994), are less accepted and more often rejected by peers (Patterson, Griesler, Vaden, & Kupersmidt, 1992), and have more behavior problems in the school setting (Patterson, Kupersmidt, & Vaden, 1990). In addition, low-SES children have lower school achievement (Patterson, Kupersmidt, & Vaden, 1990), and are four times more likely to drop out of school (Maternal and Child Health Bureau, Child Health USA 2000). Finally, children in low-SES families are more likely to use tobacco. In 1997 42% of West Virginia high school students smoked, with 11 the median age to first try smoking (Coalition for a Tobacco-Free West Virginia, 2001).

III. Study Design and Methods

A. Study Design

This longitudinal research project studying low-income White children living in rural Appalachia began when the children=s mothers were prenatal patients at a rural community health clinic and followed the children to 15 months. Major outcome variables were stability and change in temperament, attachment relationships with mother, and early language skills. The second phase assessed the children at 4 years, prior to entering kindergarten, and in kindergarten. Major outcomes were behavior problems, attachment, language and mathematics ability, and kindergarten classroom functioning. The present middle childhood phase of the research was influenced by Selman=s theories on perspective taking, work in other populations on children=s social cognition, and Ogbu=s framework for understanding minority group school success. The study design used outcomes from prior and present measures in risk and protective indices, which were then related to social adjustment, academic achievement, and tobacco attitudes/use.

Specific research questions included:

1) To what extent are the middle childhood outcome measures of social adjustment, academic achievement, and tobacco attitudes/use related?
2) How do rural Appalachian children as a group perform on standardized measures of social adjustment and academic competence?
3) Are there significant differences between standardized experiential language and processing-dependent language and between standardized test performance and nonverbal intelligence in this population?
4) What variables predict individual differences in the social adjustment, academic achievement/competence, and tobacco attitudes/use of rural Appalachian children and may be important as risk or protective factors?

B. Population Studied

Participants were rural White Appalachian children, 10 to 12 years of age, and their parents.

C. Sample Selection

In order to utilize longitudinal data, only participants from the prior studies were included. At assessment 1, 65 children (33 boys, 32 girls) participated, and at assessment 2, 60 children (31 boys, 29 girls). Participating parents were primarily mothers.

D. Instruments Used

Child measures of socioemotional development included a *perspective-taking* task adapted from Selman's best tree climber story, a project-developed assessment of *social cognition*, the social convoy measure of *social support*, the Social Experience Questionnaire to assess *peer relations*, the Harter Perceived Competence Scale for Children and the Feelings About School to measure *self-perceptions*. Cognitive abilities were assessed included *nonverbal intelligence* (the Test of Nonverbal Intelligence-3), and two *language* measures, a Nonword Repetition Task to assess processing-dependent language, and the Comprehensive Assessment of Spoken Language (core battery) to assess standardized language. Children also responded to the *Tobacco Knowledge Attitudes and Behavior Questionnaire*. Children's teachers completed the comprehensive *Teacher Questionnaire for Individual Child*, and *grades* and *SAT-9* achievement test scores were obtained from schools.

Parents provided interview data on *family demographics and events*, *family tobacco use*, *parent involvement with school* and homework, and completed the Interpersonal Reactivity Index, and the Parent Opinion Survey to assess *parenting attitudes* and the *Child Behavior Checklist* and *School Age Temperament Inventory* to report on children's behavior problems and temperament.

E. Statistical Methods Employed

Research questions were addressed with correlation, factor analysis, multiple regression, and discriminant function analysis. Risk and protective indices were constructed and both cumulative and individual effects of the indices and component variables on social competence, academic achievement, and tobacco attitudes/use were examined.

IV. Presentation of Findings

A. Language Development

Previous results indicated no difference between parents' reports of children's language abilities at 15 months and the reports of parents in the Childhood Development Inventory normative sample. However, by 4 years, and again prior to kindergarten entry, the rural Appalachian children's mean standardized language score on the Preschool Language Scale was significantly below that of the instrument's normative sample.

Lower than average scores on standardized tests of language do not always indicate language impairment, but may occur when children have had fewer or different language experiences than children in the test's normative sample. Therefore, middle childhood assessments included not only a standardized language assessment, the CASL, but also a test of phonological working memory, a nonsense word repetition task developed by Campbell and Dollaghan (1997). Results of the two assessments showed that:
1) although the children's mean score on a standardized language test had improved significantly since kindergarten and was now within the average range, it remained significantly lower than that of children from the test's normative sample, and 2) that the mean score on the nonsense word repetition task did not differ significantly from that of a mainstream comparison group.

B. Nonverbal Intelligence, Achievement Tests, School Grades, and Special Services

Group results for the TONI showed nonverbal intelligence, similar to standardized language, had a mean of 90.5, within the normal range but below the test mean of 100. SAT-9 average percentiles for reading, language, and math ranged from 48.3 to 54.9 while means for grades for the same subjects ranged from 2.6 to 2.4 (on a scale of 0 for F to 4 for A). The mean G.P.A. across five academic subjects was 2.53. Teachers reported that 18.5% of the children had an Individual Education Plan (IEP) and 32.3% received some sort of services related to special needs (including Title I reading or math). Some 37.5% of the children had repeated a grade.

C. Behavior Problems and Social Adjustment

When children were 4 years old, average behavior problems scores on the CBCL were higher than would be expected in low-risk samples, and 23.1% of the sample was in the clinical range on parent-reported externalizing problems. At 11-12 years, 35% scored in the clinical range. The teacher questionnaire scale items related to aggressive behavior were correlated with parent-reported externalizing problems, suggesting that levels of acting out behavior were seen across settings.

Social adjustment problems at home and school (specifically, aggressive behavior, oppositional/defiant behavior, conduct problems reported by parents on the CBCL and aggression, low prosocial behavior, and not being liked by others rated by teachers) were correlated in middle childhood. In addition, kindergarten teachers' rating of getting along well with others was negatively correlated with teachers' ratings at 10-11 of acting out and not being liked by peers. Parents saw a higher percentage of children as having definite adjustment problems in middle childhood than did teachers (who generally see the child in only one, structured setting). Finally, in reporting on their own experiences, most children reported experiencing low levels of aggression (75%) and high levels of prosocial behavior (56%) from peers, along with moderate levels of relational aggression (57%). Children seen by teachers as more aggressive and less liked reported experiencing more physical and relational aggression, as did children reported by mothers to have more externalizing behavior problems.

D. Self-Perceptions

On the Perceived Competence Scale for Children (Harter, 1982) with scales for scholastic competence, social acceptance, athletic competence, physical appearance, behavioral conduct, and global self-worth, *t*-tests showed that the low-SES rural Appalachian children see themselves as less scholastically competent than do same-age children in the middle-class norming sample, but not different in other areas. In addition, within-group analyses also showed significantly lower scholastic competence, compared to other areas of self-perception. Self-reported scholastic and social competence and behavioral conduct correlated in expected directions with standardized measures of cognitive ability and behavior reported by parents and teachers.

E. Tobacco Attitudes and Use

In more than 90% of families, someone (parents, grandparents, siblings) used tobacco, and in 44.7% of families one or both parents smoked or used chewing tobacco. However, the children's responses on the tobacco questionnaire showed group means reflecting generally negative attitudes toward tobacco use and low levels of experimentation with tobacco products. Almost all (98%) agreed or strongly agreed that they wished people they knew would not smoke, and although 31% said they had tried cigarettes or dip at least once, only one child indicated smoking in the last month. At this age (10-12), this generation of rural Appalachian children appears to hold attitudes which may make them less likely

to use tobacco than their parents. Boys[1] and children receiving special services and/or who had repeated a grade and children with lower language and perspective-taking skills expressed attitudes more likely to favor tobacco use. Children who reported more use of tobacco also reported lower self-worth regarding their behavioral conduct and had higher parent-reported externalizing behavior problems.

F. Prediction of Individual Differences Using Risk and Protective Factors

Following recommendations of Burchinal, Roberts, Hooper, and Zeisel (2000), the risk index approach was utilized to assess the predictive power of a number of risk and protective factors for developmental outcomes. Based on research with other low-SES groups and prior study of this rural Appalachian sample, risk and protective indices, which tallied the number of factors present were constructed and related to middle childhood outcomes.

Risk factors included[2]:
1) preschool externalizing behavior problems rated in the clinical range by parent
2) standardized language skills at kindergarten entry more than 1 s.d. below the mean
3) social adjustment rated by kindergarten teacher in lower third
4) grade(s) repeated
5) negative temperament rated by parent in the upper third
6) attention problems reported by parent (clinical or borderline) or teacher (noted as major or certainly applying)
7) high (upper third) preschool maternal over-controlling/intrusive behavior
8) high (upper third) authoritarian parenting attitudes and behavior
9) stressful life events in the family in the upper third
10) high (upper third) parental concern with outside influences (school, neighborhood)

Factors hypothesized to protect against low academic achievement, poor social adjustment, and less positive tobacco attitudes or tobacco use were:
1) a secure attachment history, in infancy and preschool
2) preschool maternal behavior rated high in facilitation (upper third)
3) high authoritative parenting attitudes (upper third)
4) high focused attention rated by kindergarten teacher (upper third)
5) high verbal intelligence rated by kindergarten teacher (upper third)
6) high nonverbal intelligence (upper third)
7) high perceived self-worth (upper third)
8) higher level perspective taking skills
9) social cognition unlikely to perceive hostile motives in others.

[1] In general, few sex differences were found.
[2] Measures without a time of data collection noted (e.g., preschool) were obtained in middle childhood.

The three middle childhood outcomes were: 1) academic achievement, measured by grade point average across academic subjects (reading, language, math, social studies, and science); 2) a factor score for social adjustment problems derived from parent-reported externalizing behavior problems, teacher ratings of aggression and not being liked by classmates, and child ratings of experiencing aggression and relational aggression; and 3) child reported tobacco attitudes and use. Not surprisingly, academic achievement and social adjustment problems were strongly inversely correlated. Academic achievement was also negatively related to tobacco use. As expected, the risk factor index was negatively related to academic achievement and positively related to social adjustment problems. The protective index was inversely correlated with social adjustment problems, but not significantly related to academic achievement. Neither summed risk nor protective factors related to children's tobacco attitudes or behavior. Thus, summed risks appeared to predict more strongly and broadly than did summed protective factors. Neither predicted tobacco attitudes/use at this age.

A second, approach to examining risks and protective factors involved using preliminary Chi Square and *t*-test analyses to guide the use of discriminant function analyses. This method was used to more specifically identify factors which significantly distinguished children who were doing well in middle childhood and children who were not.

Children with high grades (an academic G.P.A. above 3.0) were more likely than others to have had preschool language skills in the normal range, and they were rated higher by kindergarten teacher on behaviors related to focused attention (working independently, staying on task, not asking for help with simple tasks, and trying his/her best). They also were less likely to have had high preschool behavior problems or be high in negative temperament in middle childhood and were very unlikely to have attention problems or repeat grades. Thus, both verbal ability and more desirable behavior predicted better grades. Not surprisingly, in middle childhood those with high grades reported higher scholastic competence; they also had higher social acceptance, thought they behaved better, and reported higher global self-worth.

In contrast, children with low grades (G.P.A. below 2.0) differed on fewer variables. They were more likely to have attention problems and high negative reactivity, but did not differ from others on early behavior or language skills. These children reported lower feelings of academic competence, but not lower self worth in other areas or globally. Their parents were more likely to report high concerns with outside influences.

Discriminant function analysis, which takes into account relations between predictors, was used to identify the groups of variables which best distinguished children with high and with low grades. Two factors, the kindergarten teacher's rating of focused attention, and the child's global self-worth significantly discriminated children with high grades, correctly classifying 82% of children. (It

is recognized that that high self-worth is likely to be a consequence of high academic achievement, as well as potentially leading children to try harder.) Children with low grades were discriminated by attention problems and negative reactivity, with a successful classification rate of 78.3%.

Given the strong (inverse) relation between academic achievement and social adjustment problems, it was expected that some similar predictors would be identified. Children higher on social adjustment problems (highest third), like those with low academic achievement, were more likely to have attention problems and to have repeated a grade than others. They also were rated lower by kindergarten teachers on focused attention and getting along with others, and in middle childhood were higher on hostile social cognition and parent-rated negative reactivity. Their parents also reported more stressful events and higher concern with outside influences. In a discriminant function analysis, the kindergarten teacher's rating of getting along with others, the child's likelihood of explaining others' motives as hostile in ambiguous situations, and the number of stressful events experienced by the family together correctly classified children according to level of social adjustment problems 79.3% of the time.

Tobacco attitudes were predicted in a stepped regression with child sex accounting for 12% of the variance initially. The child's G.P.A. and level of perspective-taking skills, entered on the second step, accounted for an additional 14% of variance. Together, the related variables of sex and high stressful events in the family accounted for 10% of variance in tobacco behavior.

V. Discussion of Findings

A. Conclusions to be drawn from findings and (E) Policy Implications

First, academic achievement was related to both social adjustment problems and tobacco attitudes, suggesting the centrality of cognitive development and positive attitudes toward school and learning. Second, how well the child did in kindergarten, especially in the areas of focused attention and getting along with other children was important, and these kindergarten ratings were strongly predicted by preschool language ability. Findings that, although rural Appalachian children had low standardized language scores, they did not differ from norming groups on test of phonological working memory suggested that, for many of these children, lower standardized language test scores occurred because of fewer or different language experiences than other children, rather than being due to language impairment. Twenty-six percent of these children are receiving remedial services for reading, which is significantly above the national average. The children's language scores prior to kindergarten predicted vocabulary scores during middle childhood, which in turn was strongly related to receiving remedial reading services. Therefore, we suggest that everything possible should be done before children begin school to expose them to the emergent literacy experiences

known to strengthen language skills that are so important to success in learning to read.

Comparing preschool and middle childhood data on standardized tests does suggest that academic experiences have been beneficial. Although group means on preschool standardized language were more than a standard deviation below the norming population mean, middle childhood group means on standardized language and nonverbal intelligence, were within a standard deviation of the norming means, although still significantly lower. These findings suggest the need for universal pre-K education programs, now being implemented in West Virginia, to enhance early verbal and intellectual development. In addition, expansion of programs which meaningfully involve low-SES parents in the preschool education of their child, such as Head Start and Even Start, would also appear to be important.

Third, attention problems were strongly related to both academic and social problems in middle childhood, as well as earlier. Children currently identified as having attention problems had been rated low in getting along with classmates in kindergarten, and in middle childhood they had social cognition more biased toward hostile interpretation. Similarly, their preschool language skills were low, foreshadowing academic problems later. Identifying and appropriately treating attention problems early in life appears to be of great importance. Importantly, interview data from parents suggests overuse and inappropriate use of medications to deal with attention problems and little awareness of alternative approaches.

B. Explanation of limitations or possible distortion of findings

Findings are limited by sample size (60-65 at middle childhood), which limits power to detect small but statistically significant effects. In addition, because this longitudinal study focuses on a specific population, low-SES rural Appalachian white families, findings may not generalize to other groups.

C. Comparison of findings with other studies

Similar to other studies, we found that academic competence, social adjustment, and tobacco attitudes/use were inter-related (Green, Forehand, Beck, & Vosk, 1980) and that language problems co-occur with behavior problems, attention problems, and low social competence, which in turn adversely impact school performance (Toppelberg & Shapiro, 2000). Unlike other studies (Burchinal et al., 2000), parenting attitudes, and preschool ratings of mother-child interaction, were not predictive. We do not interpret this lack of direct statistical effect to mean that parenting and parent-child relations are unimportant. Rather, we note that our previous publications demonstrated relations of parenting and attachment to earlier child outcomes, outcomes which related to middle childhood

development. Also, sociocultural risk factors, which are known to affect parenting, were predictive. Specifically, higher numbers of stressful events experienced by the family, as well as higher parental concern with outside influences, related to less optimal development in middle childhood. In addition, teacher-reported cultural differences between parents and teachers and social class differences between students related significantly to children's academic achievement and social adjustment problems in expected directions.

D. Possible applications to MCH health care delivery situations

Based on findings related to the importance of early language development and identification of attention problems, early screening and linkage between health care services and preschool education programs which involve parents, could be enhanced to improve developmental outcomes for low-SES children.

E. Policy implications (See A above.)

F. Suggestions for further research

Additional longitudinal research of this and similar populations is needed to better understand long-term effects of risk and protective factors into adolescence and young adulthood.

VI. List of products[3]

Fish, M., Amerikaner, M. J., & Lucas, C. J. (in press). Dispelling the stereotypes: Rural Appalachian mothers talk about physical punishment. Journal of Appalachian Studies.

Reynolds, M. E, Fish, M., & Lewis, M. (under review). Differentiating Language Difference from Language Impairment in Low SES Rural Appalachian Children.

Fish, M. (2007, March). Self-Perceptions of Low-SES Rural Appalachian Children in Middle Childhood. Poster presented at the Society for Research in Child Development biennial meeting, Boston, MA.

Lucas, C. (2006). Perspective Taking in Rural Appalachian Children. Psy.D. dissertation, Marshall University Psychology Department.

Fish, M. & Amerikaner, M. (2006, March). Further Examination of Rural Appalachian Parenting. Presentation at Appalachian Studies Association, Dayton, OH.

Fish, M. (2005, April). Predicting individual differences in nonverbal intelligence in low-SES rural Appalachian children in middle childhood. Poster

[3] Four additional publications are currently in preparation.

presented at the Society for Research in Child Development biennial meeting, Atlanta, Georgia.

Reynolds, M. E., Fish, M., & Lewis, M. (2004, November). Language skills in rural Appalachian children: The whole story. Poster presented at the American Speech-Language-Hearing Association, Philadelphia, PA.

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Toppelberg, C. O., & Shapiro, T. (2000). Language disorders: A 1–year research update review. Journal of the American Academy of Child and Adolescent Psychiatry, 39, 143-152.

West Virginia Basic Adult Education. (2001). http://wvabe.state.k12.wvus/literacynetwork.html.