Implications of Child Characteristics for Parenting Behavior and Children's Developmental Outcomes In a Welfare Sample

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Introduction

The purpose of this paper is to begin the process of considering the role played by child characteristics in helping to shape the developmental outcomes of young children in poverty. In particular, we will examine two models (the direct effects and the interaction effects model) of child characteristics in helping to shape parent-child interaction and child developmental outcomes in a sample of families with preschool-aged children receiving welfare.

Researchers have long studied associations between parenting behavior and children's outcomes, assuming that the causal direction flows from parent to child, i.e., that parental behavior and characteristics influence children's emotional, social, and cognitive development. Bell (1968) called this unidirectional influence into question by suggesting that constitutional factors and behavioral tendencies in children may affect parenting behavior. For example, Bell and Harper (1977) noted that the behavior of children with congenital hyperactivity, learning disorders, or overassertiveness may significantly shape parent-child interaction. A substantial body of evidence has accumulated since Bell's initial alert showing that characteristics of child temperament and difficult behaviors such as those due to a limiting mental, emotional or developmental condition have an important effect on both parenting behaviors and children's outcomes.

A. Need for Study of Child Characteristics in Low-Income Samples.

1. Maternal health risks in low-income samples

Circumstances that put children at risk for developing or already having a limiting mental, learning, or emotional condition at birth may be higher in low-income samples. Poverty is thought to be associated with less prenatal care, poorer maternal health, tobacco, alcohol and drug use during pregnancy, and an increased likelihood of toxins in the immediate environment (e.g., lead paint) (Klerman, 1991). In turn, each of these health risks has been found to lead to negative outcomes for children, including diminished cognitive functioning, school failure, hyperactivity and inattention, deficits in speech and auditory processing, and behavior disorders (Newman and Buka, 1990).

Using data from the National Health Interview Survey, Child Health Supplement (NHIS-CH) McCormick, Gortmaker and Sobol (1990) showed that very low birthweight is related to various measures of school failure, such as grade repetition or special education, as well greater likelihood of having higher scores on the hyperactive subscale of the Behavior Problems Index, even after a broad array of sociodemographic factors were accounted for. Similarly, researchers using data from the National Collaborative Perinatal Project found that low birthweight is related to intelligence and achievement scores (Buka, Newman, and Gortmaker, 1990).

A recent longitudinal prospective study has shown that prenatal exposure to alcohol across the full spectrum of amount of use resulted in a significant dose-response relationship

between exposure and children's school performance at age 11. Prenatal drinking led to several classroom behavioral problems including attentional, activity, and information-processing difficulties (Olson, Sampson, Barr, Streissguth, and Bookstein, 1992). Lower cognitive functioning has been associated with cigarette smoking during pregnancy in the form of decreased IQ scores and less advanced verbal, reading, and mathematical skills (Rush and Callahan, 1989). The use of other drugs such as cocaine and crack during pregnancy has been found to be related to lower birthweight and gestational age (Chasnoff et al 1989; Cherukuri et al 1988).

Other detrimental influences common among low-income groups include exposure to lead. Dentin lead levels in children are related to reading disabilities, reading grade levels, and to dropping out of high school (Needleman, et al 1990). Mahaffey et al (1982) found that lead levels in the blood of 6 year old children were highest among African Americans in the lowest income groups and among blacks who living in central cities.

2. Prevalence of cognitive and emotional problems in low-income children

The relationship between poverty and various mental and emotional problems in children has been reported using data from NHIS-CH, 1988. Parents with lower income levels were found to report significantly more developmental delays, learning disabilities, and emotional and behavioral problems in their children (22.8%) than parents at higher levels of income (18.6%) (Zill and Schoenborn, 1990). Authors of the report emphasize that differences across income groups are likely to be understated because parents with less education and minority parents tend to report fewer such problems to survey interviewers. In summarizing the incidence of intellectual impairment in impoverished families, Martin, Ramey & Ramey (1990) reported that unlike moderate, severe, and profound mental retardation, mild mental retardation is more prevalent among lower socioeconomic groups.

It may be important to distinguish whether the higher incidence of learning disabilities, emotional or behavioral problems and mild mental retardation in low-income children arise primarily as a result of the child's environment post-birth (such as low parental cognitive stimulation or harsh discipline) or whether they may originate in constitutional factors in the child present at or soon after birth, because this could have implications for both the design and evaluation of interventions intended to promote their well-being. Although such conditions can sometimes develop as a result of environmental influences, they may also arise from prenatal, perinatal, or neonatal difficulties, which, as noted above, appear to be more prevalent among low income families. However, attention should be paid to differentiating among congenital and hereditary influences. As Lytton (1990) cautioned: "It is important to make the distinction between characteristics that are hereditary (i.e., transmitted by parental genes) and congenital ones, which in addition to hereditary characteristics, also include those that carry the effects of mutant genes and of the biological environment of the womb." The higher incidence of prenatal, perinatal, or neonatal difficulties in low-income samples is added on top of any genetically transmitted problems that may be present, even though genetic influences may be evenly distributed in the general population.

It is likely that in low-income samples, both harsh post-birth environmental conditions and prenatal, perinatal and neonatal difficulties may be operating. For example, unemployment among single African American families has been found to be associated with coercive and punitive disciplinary practices (McLoyd, Jayaratne, Ceballo, and Borquez, 1994). In a sample of families with preschool-aged children, Dodge, Pettit, and Bates (1994) found lower socio-economic status to be associated with parenting practices that were marked by a harsh and punitive approach, as well characterized by less warmth and affection. Such interactions have been shown to be associated with less optimal adjustment. Research has also shown that low-income children tend to receive less cognitive stimulation in their home environments, in the way of exposure to books, cognitively stimulating toys, language games, and interactions related to the development of literacy and language (Walker, Greenwood, Hart, and Carta, 1994).

3. Interventions for low-income children

A number of intervention programs, both public and privately funded, have been designed and implemented in an attempt to reduce the risk of negative developmental outcomes among low-income children. Many intervention models for low-income families include parenting education and/or day care as the major means of improving children's outcomes (e.g., Avance, New Chance, CCDP, Head Start, Abcedarian). Although some programs screen and treat children who appear to already be at risk of congenital cognitive and emotional problems, many do not. While both enhanced parenting behavior and high-quality day care experiences have been shown to be associated with more positive children's outcomes, such program components are not likely to be sufficient treatment for those children who may be suffering from pre-existing limiting conditions. Even when raised in adequately stimulating and supportive home environments with access to high quality day care, certain children will continue to exhibit cognitive or behavior problems. Such children may require direct treatment that goes above and beyond the effects of parenting and day care. This may be particularly true for children who have conditions that are less severe, but pervasive and likely to be longstanding, such as attentional deficits, learning disabilities and mild mental retardation. More severe conditions such as profound mental retardation or autism, being more difficult to miss, are often identified early, particularly once the child enters day care or school.

In sum, we can conclude that children in poverty more often experience limiting conditions. Yet the role of such limiting conditions in shaping parent-child interaction and children's development has rarely been studied.

B. Explanatory Models in the Study of Child Characteristics

The literature on child characteristics reflects three main explanatory models that differ in terms of their complexity, but that are not necessarily competing hypotheses: (1) the main effects model, (2) the statistical interaction effects model, and (3) the reciprocal, or transactional, effects model. We will briefly review these and consider how they might apply in our low-income sample.

1. Main Effects Model

This model asserts the primacy of either constitutional or environmental factors. As one means of evaluating primacy in shaping child outcomes, Lytton (1990) suggests testing the prediction of outcomes from early child characteristics with parenting factors held constant, against the prediction from parenting factors, with child characteristics held constant. He notes that "the relative strength of each prediction would be an index of the importance of the main independent variable -- child or parent." Consistent with this view, Stice and Barrera (1995) noted that although the "social mold" model -- that parenting leads to child outcomes -- has been well established, longitudinal studies rarely control for initial levels of child problem behavior before claiming valid prediction to child outcomes.

Focusing on the development of conduct disorder in children, Lytton (1990) has reviewed numerous studies using a variety of research approaches from such areas as the interactions between unrelated mothers and children, reaction to punishment, autonomic reactivity, biochemical factors, and longitudinal studies of delinquency, and concluded that this broad literature demonstrates the primacy of the child's own contribution to conduct disorder. Examples of such work include a study showing that children's difficultness in preschool predicts delinquency in adolescence, independently of the quality of the parent's child-rearing practices (Loeber, et al 1987). West and Farrington (1973) also showed that boys' "troublesomeness" at ages 8 and 10 (assessed by teachers and peers) predicted later delinquency even after poor parental supervision and large family size had been controlled. The reverse, however, was not true, as the authors report: "the parental factors, which independently had a significant association with delinquency no longer were significant once troublesomeness was taken into account." A longitudinal study by Lambert (1988) showed that child factors such as prenatal and perinatal experiences and the child's health and early temperament were better predictors of conduct disorder at age 17-18 than family environment factors.

2. Statistical Interaction Effects Model

In low-income samples where negative environmental influences may be prevalent, children who have a limiting condition are likely to be the most at risk for having poor outcomes. Indeed, researchers have hypothesized that outcomes may be best explained by the interaction of constitutional and environmental factors (Sameroff and Chandler, 1975; Lytton, 1990). An interaction hypothesis would ask: Are the effects of child characteristics different depending on different levels of environmental input? For example, in a study of twins, Wilson (1985) reported that the initially powerful effects of low birthweight did not exert a long-term handicapping effect on mental development for families with upper socioeconomic status (SES), but only for those with lower SES. In another study, poor children who had experienced perinatal insult had worse developmental outcomes than non-poor children who had experienced comparable insult (Escalona, 1982).

A very recent study using primarily intact two-parent non-minority families with highly educated parents found interaction effects between child temperament and family process

variables (Tschann, Kaiser, Chesney, Alkon, and Boyce, 1996). The authors reported that children who had "more difficult temperaments and who were in high-conflict families had the most internalizing and externalizing behavior problems, while children with easy temperaments had fewer such problems, regardless of levels of family conflict."

The present study of child characteristics focuses on a sample that is relatively homogenous with respect to income and general SES. However other aspects of the environment, in this sample, such as parenting behavior and the home environment, have been found to vary widely and to explain variation in children's outcomes (Moore, Zaslow, Coiro, Miller, and Magenheim, 1995). It is not clear whether, within lower SES welfare groups such as our present sample, such interactions may exist for early child characteristics and other environmental influences such as parenting behavior and the home environment.

3. Reciprocal (Transactional) Effects Model

The reciprocal, or transactional, effects model superimposes an additional layer of complexity on the interaction hypothesis. It posits that "outcomes are best explained by reciprocal and recurrent interactions over time between the organism and the environment" (Lytton, 1990). In this conceptual framework, child behavior elicits parental reactions and shapes parental practices which influence children's behavior; in this way the causal influence is bidirectional. An example of transactional, bidirectional effects is Patterson's (1982) "coercive cycle" in mother-aggressive-child interactions, where the child initiates an antisocial action, the parent responds with an aversive reaction, which, in turn, escalates the child's aggressive behavior. Another example is Bell's (1971) control systems theory which proposes that parents and children regulate each other through "upper limit" (reducing, redirecting) or "lower limit" (priming, stimulating) control behavior. In 1986, Bell and Chapman reviewed 14 studies that tested hypotheses derived from the control systems model, and concluded that they offer convincing evidence that parents do react to child characteristics in specific and often predictable ways, although the flow of influence in the opposite direction, that is, from parent to child, was usually not explicitly examined in these studies, but rather assumed.

An exemplary study using longitudinal data to explore the full bidirectional effects of the reciprocal model was conducted recently by Stice and Barrera, Jr. (1995). Covariance structural modeling was used to reveal bidirectional relations between adolescent substance use and amount of parental support and control. This study was the first to find that child problem behavior in adolescence leads to specific parenting behaviors, with child effects and parent effects being approximately equal in magnitude.

Many other studies, some of which are reviewed briefly below, provide partial support for the reciprocal effects model. These studies carefully examine whether there is evidence for the flow of influence from child to parent, but they do not fully satisfy Lytton's definition of reciprocal effects since the path from parent to child is not also analyzed, and because the studies do not take into account the effect of time. Nonetheless, taken together, these studies do offer convincing evidence that children themselves play an active role in shaping parental behavior.

Starting with the very beginning of life, child temperament has been found to affect the responses of neonatal nurses in the newborn nursery (Breitmayer & Ricciuti, 1988). The authors reported that "alert babies received the most nurturant and social contact; active infants received the least contact but the most comments that reflected concern about their health; irritable infants were soothed most." Lee and Bates (1985) found that infant "difficultness" at 6 and 13 months predicted observed mother-child conflict at age 2 years. In a study that took place in a nursery school, caregiver adults were trained to respond to children in prescribed ways (in either a high or low nurturant role) but their behavior was in fact found to be systematically related to and modified by child characteristics, such as dependency, friendliness, aggressiveness, and social reinforcement of the adult by the child (Yarrow & Waxler, 1971). Keller and Bell (1979) trained 9-year old girls to act high and low in "person orientation" as confederates in a laboratory study where adults who were unaware the children were trained were asked to encourage the child to do something prosocial for another child. The interactions of adults with children high in person orientation produced reasoning about the consequences of acts, while that with children lower in person orientation involved bargaining with material rewards.

Parent-child interactions have also been predicted from preschool children's activity level (Buss, 1980). Consistent with Bell's control systems theory, Buss showed that parents of highly active children often physically intruded and got into power struggles and competition with their children, and showed impatience or hostility toward them. In contrast, interactions involving less active children were generally "peaceful and harmonious." Barkley and Cunningham (1979) used a triple-blind, drug placebo crossover design to study the effects of the drug methylphenidate (Ritalin) on the mother-child interactions of hyperactive children, and found that the hyperactive children receiving the drug "were more compliant with maternal commands, and in response, mothers displayed increased attention to compliance while reducing their directiveness."

Other studies have compared the parent's versus the child's behavior as determinants of disciplinary technique. In a study where mothers were asked to describe the discipline they would use with their children in situations involving various misdemeanors, mothers reported favoring discipline that was determined more by what the child did than by some consistent child-rearing approach on the mother's part (Grusec & Kuczynski, 1980). In another investigation that examined mother's implicit theories of discipline, mothers favored power-assertive parenting over methods of induction, the more they inferred that children had understood the rules they had violated, had the capability to act more appropriately, and were responsible for their negative behavior (Dix, Ruble, & Zambarano, 1989).

When child characteristics such as difficult behavior and temperament appear early and are strong, we may suspect that they are biological in nature. Nonetheless, Bell and Chapman (1986) noted that it is not necessary to assume genetic or congenital contributors in order to propose child effects. That is, "even though a child may develop these characteristics primarily as a result of interaction with parents, once the child has reached a certain developmental status, the child would be operating from that basis and the parent would have to react accordingly."

Lytton (1990) agrees by stating that "child effects also carry with them the effects of prior encounters with the environment in the same way that parental effects carry with them genetic-biological factors... Nevertheless, in research that studies parental treatment of the child together with child characteristics... parental effects are generally a working approximation to main effects from the environment, and child effects are a working approximation to main effects from the genotype, as well as from the biological environment (the womb) and the early social environment." While the data available for the current study cannot completely separate environmental influences from those attributable to the child only, we will use the above logic in considering such effects.

Citing Campbell and Stanley (1979), Stice and Barrera, Jr. (1995) remind us that a valid test of the reciprocal effects hypothesis requires longitudinal data because "temporal precedence is a necessary condition for the demonstration of causal relations using nonexperimental data." Longitudinal data that includes both parenting and child outcome variables are becoming available for the current sample, and will in the future be used to test predictions from the reciprocal effects hypothesis, as outlined later in this paper. As the first step, however, the current paper will rely only on contemporaneous data.

Aims of the Present Study

The association of child characteristics with parenting and child outcomes has rarely been examined in samples of low-income families. This paper will attempt to address the following questions:

1. What is the incidence, in a sample of poor families, of early child characteristics that may place children at risk of having or developing a limiting condition?

2. Are the identified child characteristics so interrelated and do they occur together often enough that there is only one characteristic that could be used as an overall indicator of child risk for a limiting condition? If not, what is the frequency of individual characteristics, and how many of these do children have, on average? How many children have multiple characteristics?

3. When child characteristics are summed to create an overall score representing risk for a limiting condition, what is the relationship of the summary risk score to family characteristics, such as level of income, child sex, and maternal literacy?

4. Is the summary risk score predictive of child outcomes? Does it predict to child outcomes over and above the role played by parenting behavior and home environment? Do measures of parenting behavior and home environment predict to child outcomes over and above the role played by the risk measure?

5. Do measures of parenting behavior moderate the effects of the child characteristics? If so, in what way do parenting and child characteristics interact? Specifically, does more

favorable, as opposed to less favorable parenting behavior tend to reduce negative outcomes for low risk children, but not for high risk children?

Question 4 examines the main effects model, and question 5 looks at the statistical interaction effects model. The reciprocal effects model will be examined in future work.

METHODOLOGY

Sample

The data for this study were derived from the JOBS Child Outcomes Study, an ongoing longitudinal evaluation which is following the development of a sample of about 3,000 children whose mothers were participating in the evaluation of the Job Opportunities and Basic Skills (JOBS) Training Program; a federal program implemented in response to the Family Support Act of 1988. This study is the first to evaluate the implications of a national welfare policy for children and is funded by the U.S. Department of Health and Human Services and the Department of Education, with additional funds from the Foundation for Child Development, the William T. Grant Foundation, and an anonymous funder. The JOBS Child Outcomes Study is embedded within the larger national evaluation of economic impacts of the JOBS program, involving 55,000 families in seven sites, being conducted by the Manpower Demonstration Research Corporation.

The first wave of data from the JOBS Child Outcomes Study (called the JOBS Descriptive Study) involved 790 participants from one of the study sites, Fulton County, Georgia. Ninety-minute in-home interviews with mothers and direct assessments of their 3 to 5 year-old children were carried out on average 3 months after families enrolled in the evaluation, with the aim of describing the families' circumstances and the young children's development close to the start of the evaluation. Analyses conducted on these data (Moore, Zaslow, Coiro, Miller, and Magenheim, 1995) show that there is substantial heterogeneity in both parenting practices and in the children's development. Participants in the JOBS Descriptive Study were welfare recipients who were randomly assigned to either a control group or to one of two experimental groups, required to participate in educational or job search activities in order to enhance their economic self-sufficiency.

The 200 families in the current study were drawn from the control group of the Descriptive Study sample. Forty-three percent of the children were 3 years old, 54.5% were 4 years old, and only 2.5% were 5 years old at the time of random assignment. The sample includes 94 boys and 106 girls. All the mothers in this sample were over the age of 21 and 97.5% were African American.

It is particularly important to note for the present analyses that families with a member who had a serious disability were exempt from the JOBS Program altogether, and therefore any

such children are not included in our sample. However, many young children who in fact have a mental or emotional condition may not be identified or diagnosed until they reach school age or unless they are in formal, high-quality child care where workers are trained to identify children in need of evaluation. Since the current sample was comprised of control group members (in which the mother was not mandated to be in school, working, or in a job training program) where the focal child was 3 to 5 years old, the families were unlikely to have utilized high-quality child care or to have had their child in school (although some children were in Head Start programs).

Measures

Child Characteristics

In the present investigation, our focus is on that aspect of child characteristics that involves factors known or suspected to be associated with risk for developing or having a limiting mental, learning, or emotional condition. These risk factors may be present at birth or early in the child's life. It is important to note that the risk factors selected for this study do not necessarily represent confirmed presence of a limiting condition, but rather they can be considered indicators that a condition *may* be present or may be likely to develop. Because of the suspected high incidence of prenatal and other health problems in our low-income sample, the child characteristics examined in this paper focus primarily on health problems, though they include markers of possible behavioral conditions.

Children were scored as having (score of 1) or not having (score of 0) the following risk factors:

Low birthweight. In accordance with the usual standard in the fields of medicine and research, low birthweight was defined here as 5.5 lbs (2,500 grams) or below, and was reported by the mother. Although recent evidence shows that there are significant differences between the outcomes of low birthweight and very low birthweight children, there were too few very low birthweight children in this limited sample to support analyses of them as a group.

Prematurity or intensive care at birth. This item was a single "yes/no" question asked of the child's mother.

Health rated as less than excellent or very good. For this measure, the mother was asked to describe whether the child's current health was excellent, very good, good, fair or poor. The item was then dichotomized as indicated in order to allow comparison to analyses making this distinction using nationally representative data. For example, analyses involving NHIS data, which uses a similar measure, cuts the scale at the same point (U.S. Dept. Of Health and Human Services, 1996).

Behavior rated as extremely restless, fidgety, overactive, or inattentive. This score was a sum of two ratings made by an interviewer and based on her observations of the child during the home visit that took place to conduct the maternal interview and child assessments.

The interviewer rated the child on a yes/no measure of whether the child "appeared extremely restless, overly active, or fidgety", and on a 0-10 scale from "completely inattentive, unable to focus on tasks" to "attentive for entire testing session." To avoid obtaining a large number of cases where the child was not displaying a serious attention problem, we attempted to identify extreme scores on this item. The median response was 8 on the 0-10 scale; a cut of 3 or below was selected. In this way, only 5 percent of the sample children were rated as extremely inattentive; a lower cut would have yielded 3 or fewer cases. The attention measure was then combined with the yes/no overactive measure resulting in scores ranging from 0 to 2. To create the risk variable, the measure was then dichotomized so that cases with a score of either 1 or 2 were categorized as being at risk for hyperactivity or attentional problems (29 cases), while those with 0 were considered not at risk (168 cases).

Child received a rating of extremely slow to warm up or extremely shy. This measure was a sum of three ratings made by an interviewer and based on her observations of the child during the home visit that took place to conduct the maternal interview and child assessments. On a 0-10 scale, the interviewer rated the child's shyness when she first met the child, from "extremely shy" to "very outgoing, no hesitation"; then on a second 0-10 scale with the same endpoints, the interviewer rated the child's shyness during the child's testing session. Finally, the interviewer was asked to rate the child on how long it took for him/her to warm up to the interviewer. Interviewers rated children on a 1-7 scale, ranging from "No warmup necessary, child friendly immediately" (lower end of the scale), to "Child warmed up in about 5-10 minutes"(midpoint of the scale) to "Child did not warm up at all" (high end). As in the hyperactive rating, we attempted to create a summary score that would reflect extreme scores. The median on both 0-10 scales was again 8; and as before, a cutpoint of 3 was selected. The median was 1 on the 1-7 slow-to-warm scale. This item was cut at 5 or above, which yielded 3% of the sample as being very slow-to-warm. The three dichotomized measures were then summed resulting in a measure ranging from 0-3. Finally, the measure was dichotomized so that cases with scores of either 1, 2, or 3 were classified as being at risk for a shy/withdrawn temperament (12 cases), while cases that received a score of 0 were considered to be not at risk (182 cases). Although being very slow-to-warm or shy may not be symptomatic of a limiting condition, it may represent one aspect of temperament that may make it difficult for the child to function socially.

The child had a limiting condition, as indicated in the mother's responses to the following two questions:

(1) Does your child have a handicap, illness, emotional problem or mental condition that limits his/her ability to attend school, to exercise or participate in sports, or that requires special medication or equipment?

(2) Does your child have any handicap, illness, emotional problem or mental condition that makes it hard for you to go to school or find a job?

A child was counted as having a limiting condition if the mother responded "yes" to either of the above questions (though only four parents responded positively to the second item).

As noted above, it is important to recognize that at ages 3-5, few parents with a child who appears to have a mental or emotional problem will have had their child professionally evaluated for a limiting condition. Data from the NHIS-CS, 1988 show that while only 9.5% of mothers of 3-5 year old children in the general population report that their child had a delay in growth or development, a learning disability, or an emotional problem, the figure jumps to 19.1% at ages 6-11 years (Zill and Schoenborn, 1990). One important reason for this may be that most children with milder disorders such as learning disabilities are not picked up until they enter school. The likelihood that a low-income mother will have had her child evaluated by ages 3-5 is probably even lower because of decreased access to health care services, less use of high-quality day care providers, and lower parental education.

Parenting Measures

The Descriptive Study interview included both an established measure of the home environment, as well as new items that could be combined to create new parenting measures intended to more fully address the specific needs of a low-income sample and to hopefully improve on the traditional measure by focusing on more specific domains of parenting behavior. Here we focus on the established measure, since it provides a composite picture of the various aspects of parenting and the home environment, and it has the important advantage of drawing on both maternal reports of parenting as well as ratings made by the interviewer based on direct observation of the home environment.

HOME-SF. Interviewers administered the short form of the early childhood version of the Home Observation for Measurement of the Environment, or HOME Inventory, during the home visit. The short form of the HOME was adapted from Bradley and Caldwell's (1984) longer measure, and has been used in surveys such as the National Longitudinal Survey of Youth-Child Supplement (Baker, Keck, Mott & Quinland, 1993). As noted above, the HOME-SF includes both interviewer ratings and maternal report items that elicit information about the cognitive stimulation and emotional support that parents provide their children. In accordance with the standard practice, the 25 items[1] of the HOME-SF were typically scored in a yes/no format to indicate the presence or absence of risk in the home environment to a child's development. Responses were summed to create a Total HOME-SF score, a subscale for Cognitive Stimulation (14 items), and a subscale for Emotional Support (11 items).

Analyses using NLSY-CS data indicate that the HOME-SF is both closely related to indices of family poverty, and is sensitive to small increments in family income (Garrett, Ng'andu, and Ferron, 1994; Moore, Morrison, Zaslow and Glei, 1994). The longer, full version of the HOME from which the HOME-SF was adapted has been found to be related to measures of poor school performance, developmental delay, child cognitive development, and IQ (Bradley, Caldwell, et al, 1989; Elardo, Bradley and Caldwell, 1975; Gottfried, 1984).

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[1]This scoring scheme excluded one item that focuses on contact with the child's father due to the fact that contact between children and their fathers was very infrequent in this sample.

Child Outcome Measures

Three measures of child development were administered and will be used as child outcomes[2] in this investigation. Two were direct measures of cognitive achievement and school readiness: the Peabody Picture Vocabulary Test - Revised (PPVT-R) and the Caldwell Preschool Inventory (PSI), while the third measure was intended to provide an indication of the child's social and emotional adjustment.

PPVT-R. The Peabody Picture Vocabulary Test - Revised (PPVT-R) is a measure of receptive vocabulary and is highly correlated with measures of both intelligence and school achievement (Dunn and Dunn, 1981). Raw scores on the PPVT-R are converted into standard scores, based on the child's age. The PPVT has been criticized on the grounds that it may underestimate the cognitive ability of minority children; yet empirical research has shown that the measure predicts IQ scores for both African American and white children (Halpin, Simpson, and Martin, 1990), and predicts achievement among at-risk preschoolers (Bracken and Passe, 1983; Kutsick, Vance, Schwarting and West, 1988).

Caldwell Preschool Inventory. The Caldwell Preschool Inventory (PSI) is a 32-item inventory of skills and concepts important for preschool children to know before entering school (Caldwell, 1970). Areas assessed include knowledge of colors, shapes, and numbers; ability to follow directions; understanding of relationships such as "under" or "behind"; and knowledge of the meaning of words such as "dentist" or "breakfast". The PSI is a useful complement to the PPVT-R because it measures abilities directly related to school success, whereas the PPVT-R is typically viewed as a measure of general cognitive achievement.

Personal Maturity Scale. In addition to the above two direct assessments, mothers reported on their children's social and emotional development on the Personal Maturity Scale (PMS). The PMS is a 14-item measure of the child's socio-emotional development and personal maturity and was adapted from the 1976 National Survey of Children. The PMS includes items such as "Acts too young for his/her age", "Is polite, helpful, considerate of others", and "Fights too much, teases, picks on or bullies other children". In the Beginning School Study, a study of children's academic and social development from the first grade forward, teacher-reported scores on the PMS predicted parental and child expectations for the child's achievement, a parental estimate of the child's academic ability, and child's end-of-year grades, net of the child's performance on standardized tests (Alexander and Entwisle, 1988). These findings suggest that the PMS provides a measure of socio-emotional development that may have important implications for later academic performance.

Results

[2]The term "child outcomes" as used in this paper does not imply a later time of measurement, but rather refers to measures of children's developmental status at this timepoint.

A. Incidence of the Selected Child Characteristics

The incidence of each of the selected child characteristics in the present sample is shown in Table 1. Wherever possible in the following section, figures from nationally representative datasets will be contrasted with the incidence found in this low-income sample. Low birthweight was found in 11 percent of the sample children, substantially higher than the national average of 6.9 percent (MMWR, 1990), but comparable to the 13 percent rate for African Americans in 1992 (NCHS). As may be expected, prematurity/intensive care at birth closely paralleled the figure for low birthweight at 11.7 percent. Eighteen percent of mothers in the sample rated their children as having health that was less than excellent or very good. This figure is comparable to the national average of 20 percent for children under 5 years of age in the NHIS, 1993 (NCHS), but not as high as the 30 percent rate for African Americans under 5 years in 1992. This may reflect the fact that the families in this sample exclude those who have a member with a serious health problem, as well as the possibility that many of the AFDC families also were receiving Medicaid benefits.

Interviewers rated almost 15 percent of the sample children as extremely restless, fidgety, overactive, or inattentive. According to the Diagnostic and Statistical Manual of Mental Disorders IV, these behaviors are symtomatic of attention deficits which may appear with or without hyperactivity. Although no nationally representative data are available for this disorder, reviews of prevalence estimates from a variety of communities indicates that attentional deficits/hyperactivity ranges from 2 to 10 percent (Wender, 1987; Cocozza, 1992). Interviewers rated 6 percent of children as extremely slow-to-warm or shy. Because this measure is a composite of interviewer-reported ratings of an aspect of temperament, it is difficult to identify a comparable figure for the general population. Finally, 9 percent of mothers reported awareness that their child had a limiting physical, medical, emotional, or mental condition. Of these, 9 reported that their child had asthma or allergies, 1 reported Attention Deficit Disorder, 4 had a speech impairment, 1 had a hearing impairment, 4 children had heart trouble or a blood disorder, and 2 others were reported as "unknown".[3] This rate for presence of a limiting condition compares to 4 percent, the overall average for chronic limiting conditions reported in NHIS, 1992 for children ages 0-4.[4]

B. Summary Score for Risk of a Limiting Condition

Table 2 shows intercorrelations for the risk factors described above. As can be seen, the factors were not highly or pervasively interrelated, although a number of significant correlations

[3]Children could have more than one condition; thus the number of cases slightly exceeds 9% of the sample.

[4]Unlike the present sample, the NHIS figure includes infants and toddlers. Though not confirmed, this may possibly have the effect of reducing the overall average for children 0-4, since fewer infants are likely to be diagnosed with a chronic condition.

were found. As expected, low birthweight was moderately related to prematurity/intensive care. In addition, health was moderately associated with the slow-to-warm measure. The measures of premature/intensive care, hyperactivity/inattention, slow-to-warm, and the health rating were all significantly though not strongly related to the limiting condition measure.

Since the seven risk factors were not highly or consistently related, they were summed to create an overall score for risk of a limiting condition. Previously each of the above risk factors has been studied in isolation, and sometimes one or two (such as low birthweight) have been included in summary risk scores that involve both environmental influences and biological factors. However, it may be important also to consider the accumulation of these child characteristics. Researchers studying environmental influences have found that the role played by a cumulative risk score in explaining child outcomes is often greater than that played by the individual factors themselves (Garmezy, 1993; Sameroff, Seifer, Barocas, Zax, and Greenspan, 1987). Similar reasoning may apply to child characteristics defined in the way we have defined them here. For example, a child with poor health, hyperactivity, and a speech impairment may be expected to have much greater risk for poor outcomes than a child with only one of these conditions.

Table 3 shows the frequency distribution of scores on the summary risk scale. Nearly half of the sample (47%) was found to have at least one of the seven risk factors. Looking at the distribution in terms of less versus greater cumulative risk, over 3/4 of the sample (83%) had none or only one risk factor, while the remainder (17%) had 2, 3, or 4 factors. Some of our analyses will distinguish between children with either no risk or only one, and those having two or more risks.

The summary risk score was first examined for its relationship to family background variables documented prior to random assignment within the evaluation. Using analysis of covariance procedures controlling for child sex and age, no differences were found on the summary risk measure for number of children in the family, maternal scores on math and literacy tests, maternal receipt of AFDC as a child, the duration of time the mother had been on welfare, or the family's income level. However, significant differences were found on a measure of maternal educational attainment. Mothers who had no high school diploma, GED or college experience had children with a higher score on the risk measure, $F(194,2)=6.31$, $p < .01$.

Table 4 shows the correlations of the individual risk factors and the summary score with the child outcome measures. While none of the individual factors related to all three assessments, the summary risk score was significantly and negatively, though not highly, associated with the direct assessment of school readiness and the maternal report of the child's socioemotional development. The limiting condition measure was related to PMS scores, the measure of slow-to-warm was related to PPVT scores, and the measure of hyperactive behavior was associated with both PSI and PMS scores.

C. Main Effects Model

We turn now to an examination of the main effects model of child characteristics. First, multiple regression techniques were used to examine the relation of the summary risk score to child outcome measures after controlling for child age and sex. The cumulative risk score significantly predicted children's scores on all three outcome measures: for PPVT-R, B = -.16*, for PSI, B = -.17**, for PMS, B = -.14*. Next, a test of the main effects model described in the introductory section of this paper was conducted. Table 5 shows standardized regression coefficients resulting from tests of the main effect of the risk score controlling for parenting, and, conversely, the main effect of each parenting measure controlling for risk. All analyses in Tables 5 controlled for child sex and age, as well as the opposing main effect. Separate analyses were conducted for the HOME-SF Total and each subscale.

The shaded columns of Table 5 show results for our first question: Does the risk score predict child outcomes once measures of the home environment have been taken into account? As can be seen, the risk score continued to negatively, significantly and consistently predict the two cognitive child outcomes (the PPVT and the PSI), each time that a home environment measure was controlled. On the socioemotional outcome (the PMS), the risk score reached significance only for the analysis where the HOME-SF Total was controlled, while the coefficient approached significance on each of the subscales.

The remaining (unshaded) data columns in Table 5 reflect the reverse test: Do the measures of the home environment continue to predict the child outcomes once the risk measure has been taken into account? There it can be seen that parenting positively and significantly predicts outcomes after controlling for risk, with one exception: The HOME-SF Emotional Support subscale no longer predicts PPVT scores once risk has been taken into account.

In sum, both parenting and child characteristics appear to be independent and important influences on children's cognitive and socio-emotional development, according to the significance of the coefficients, though the magnitude of coefficients for the home environment is often numerically larger than those for risk.

D. Interaction Tests

We now turn to the test for the statistical interaction effects model, as outlined in Aim #5 of the introduction. Because there did not appear to be a prior literature or theory to guide the choice of cutpoints, the home environment scores were grouped into those falling above and below the median, and the summary risk measure was dichotomized to create a low risk category (none or only 1 risk factor; n=167) and a high risk category (2 or more risk factors; n=33), thereby allowing a simple 2 x 2 design. When crossed by high and low parenting, the number of cases per cell varies with parenting measures (as shown in Tables 6a-c). In particular, the cell "n" for high risk children by high and low parenting often falls below 20, thus, caution is recommended in interpreting the statistical significance of effects particularly for the high risk subgroup since the power to detect effects is likely to be quite limited. Analysis of covariance

procedures were used to examine the full factorial effects of the two factors, yielding means adjusted for child age and gender. [5]

Since no prior studies examining interactions between parenting and risk for a limiting condition (particularly in a low-income sample) were found, it was difficult to hypothesize the nature of such interactions. However, since parenting effects have been found to be important for the development of children in general, it seemed reasonable to expect that such effects may hold for children at low risk of a limiting condition. The question of concern, then, is whether differences across parenting would also occur for children at high risk.

As can be seen in Tables 6a-c, despite being dichotomized, the main effects for both parenting and risk measures were often significant and consistent with the prior multiple regression analyses. In general, the following pattern of means was found:

1. The most favorable outcome scores emerged for the group that had low risk but parenting that was above the median;
2. The poorest outcomes emerged for the group with high risk and parenting that was below the median; and
3. Scores for the remaining two categories, children with low risk but scores below the median on parenting, and children with high risk but parenting that was above the median, were found to fall between the above two extremes.

The nature of any significant interactions between parenting and the child risk score was expected to take the form of statistically significant mean differences for low risk children across levels of parenting, but nonsignificant differences across levels of parenting for high risk children. As shown in Tables 6a-6c, none of the overall interaction effects were significant. Yet this may not be surprising in light of the small sample size for high risk children (n=33).

In examining the effect of parenting specifically for high risk children, we find that mean PPVT-R scores do not significantly differ across levels of parenting (see Table 6a) whereas scores are significantly different across parenting levels for low risk children. Children whose home environments were rated above the median and who had low risk of a limiting condition score the highest on the PPVT. This was the case for the Total HOME-SF and also for each of its subscales.

Turning to Table 6b, however, we note that mean scores on the PSI do differ as a result of the dichotomized Total HOME-SF measure for both high and low risk children. Above the median Total HOME-SF scores were associated with significantly more favorable PSI scores even for high risk children (although this was not always the case for the subscales).

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[5]Regression analyses using the continuous measures yielded the same results in terms of significance levels of interaction effects.

The pattern of significant differences on PMS scores (shown in Table 6c) for high risk versus low risk children is more difficult to interpret. Mean differences for the both the high and low risk groups only approached significance on the Total HOME-SF measure. A compelling pattern of significant mean differences on the PMS did not emerge for the two subscales.

These interaction findings should be interpreted with great caution. Although not statistically significant, the pattern of means sometimes appears to be consistent with the expected interaction.[6] However, we also sometimes find that the numerical differences across parenting levels are similar for the two risk groups, yet the p-level across parenting for the low risk category is significant while the p-level across parenting for the high risk group is nonsignificant. These discrepancies may well occur as a result of the small sample size for the high risk group. Because we cannot have confidence in these findings due to limited power and lack of statistically significant interaction effects, we conclude that these data do not necessarily support a moderation hypothesis for parenting and risk.

Conclusions

Returning to our research questions, we conclude that the young children in this low-income sample show a relatively high incidence of characteristics that are associated with learning, mental, or emotional problems, since 47 percent of the sample children had at least one of the risk factors studied. Furthermore, it appears that cumulative risk for such a limiting condition may be important since not an inconsequential number of the children had two or more of the risk factors. When the cumulative risk score was used predictively, it was seen to be consistently associated with children's developmental outcomes, both before and after parenting influences were taken into account. In testing the reverse hypothesis that parenting continues to predict to child outcomes after the risk measure is controlled, we observed that the home environment also continues to exert its own unique and independent influence. We conclude that both main effects are important predictors of children's outcomes.

The moderation hypothesis for parenting and child characteristics was not supported in this data, though power was limited to detect such effects. Rather, the pattern suggested that the children who were least at risk for poor outcomes were those who were both at lower risk for a limiting condition and had more favorable home environments, whereas children with poorest outcomes had higher risk and less favorable home environments. Thus, we find more of an *additive* than an interactive effect for children's limiting conditions and parenting behavior.

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[6]For example, the difference between PPVT-R scores across levels of HOME Emotional Support for children at low risk was nearly 5 points, a significant difference, while the corresponding difference for high risk children was only .32, a nonsignificant difference.

Implications for Intervention Programs

These findings may have implications for intervention design and implementation, as well as treatment. First, they suggest that a significant proportion of young low-income children may be at high risk for having or developing a mild but potentially important limiting condition. Treatment and early intervention that directly involve the high risk child may be critical, in addition to parenting education, in preventing serious negative outcomes in such children. These findings also suggest that policies for low-income children aimed at encouraging early assessment, identification, and treatment of less obvious limiting conditions such as learning disabilities or hyperactivity may be important.

Implications for Intervention Evaluation

The implications of child characteristics for children's outcomes has sometimes been neglected by those who examine the effects of intervention programs for poor families. Although there are many potential factors involved in the development of children in low-income families besides parenting (e.g., child care, maternal depression, stress, social support, and quality of the neighborhood) often the only child characteristics included in analyses are the child's sex or age, while measures of temperament, early difficult behavior, or prenatal and perinatal influences are not used as factors in analyses that predict to developmental outcomes. Moreover, the potential reciprocal nature of the parent-child relationship in the context of a program evaluation may carry an important but unstudied influence on children's outcomes. The present study underscores the importance of including measures of child characteristics in studies of the development of children in low-income samples.

Implications for Child Care Providers

Child care providers are often unequipped to deal effectively with children who have special needs. Hyperactive children, for example, pose significant problems for workers who are not carefully trained to respond to them in effective ways. Such children's behavior and overall functioning may worsen and become unmanageable when there is a lack of appropriate care. This point has come to the attention of private foundations, who are beginning to show interest in studying mental health approaches in early childhood settings, particularly as it relates to low-income children. The need for trained child care workers may be even more important in light of new welfare reform legislation, as more and more low-income children are expected to move into child care settings when their parents are required to move into jobs.

Implications for Further Descriptive Research

With longitudinal data for this sample now becoming available, including direct in-home behavioral observations of mother-child interaction, it will be possible to examine the reciprocal effects model. In this future work we will be able to use structural equation modeling to ask whether child characteristics (defined as in the present paper as well as in terms of observed

interactive behaviors) help to shape parenting behavior, and whether parenting behavior in turn shapes child outcomes over time.

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Table 1

Child Characteristics used in creating Summary Risk Score

Characteristic	Percent
Low Birthweight (5.5 lbs. or below)	11.0
Child was premature or had intensive care at birth	11.7
Health reported as less than excellent or very good (mother report)	18.2
Interviewer observed and rated child as extremely restless, fidgety, overactive, or inattentive (2 ratings)	14.7
Interviewer observed and rated child as extremely shy or slow to warm (3 ratings)	6.2
Mother report of a limiting physical, mental, or emotional condition in child	9.0

SOURCE: JOBS Descriptive Study data.
NOTES: Sample size = 200.

Table 2

Intercorrelations of Risk Factors and Summary Risk Score

	Low Birth weight	Premature/ Intensive care	Health	Hyperactive behavior	Slow to warm	Limiting Condition	Summary Risk Score
Low Birth weight	--	.28***	.05	-.09	.12	.06	.48***
Premature/ Intensive Care		--	-.04	-.11	-.03	.17*	.43***
Health			--	-.01	.26***	.14*	.54***
Hyperactive behavior				--	.13	.17*	.40***
Slow to warm					--	.14*	.50***
Limiting condition						--	.55***
Summary Risk Score							--

SOURCE: JOBS Descriptive Study data.
NOTES: Sample size = 200.
*** $p < .001$
** $p < .01$
* $p < .05$

Table 3

Frequency Distribution of Scores on Summary Risk Scale

Number of risk factors	Percentage Distribution	Coding for Dichotomous Measure
0	53.0	0
1	30.3	0
2	12.6	1
3	2.0	1
4	2.0	1

Sample size = 200

SOURCE: *JOBS Descriptive Study data.*

NOTES: Percentages do not total 100 due to missing data for two cases.

Table 4

Correlations of Risk Factors and Summary Risk Measure with Child Outcomes

Risk Factor	PPVT	PSI	PMS
Low Birthweight	-.13	-.05	.01
Premature/Intensive care	.01	-.02	-.08
Health	-.07	-.03	-.01
Hyperactive behavior	.03	-.17*	-.16*
Slow to warm	-.18**	-.12	-.10
Limiting condition	-.04	-.08	-.14*
Summary Risk Measure	-.12+	-.16*	-.16*

SOURCE: JOBS Descriptive Study data.
NOTES: Sample size = 200.
*** $p < .001$
** $p < .01$
* $p < .05$
+$p < .10$

Table 5
Standardized Regression Coefficients on Child Outcome Scores[1]

	PPVT-R		PSI		PMS	
Parenting Scale	**Beta weight of parenting predicting PPVT, controlling for summary risk score**	**Beta weight of summary risk score predicting PPVT, controlling for parenting**	**Beta weight of parenting predicting PSI, controlling for summary risk score**	**Beta weight of summary risk score predicting PSI, controlling for parenting**	**Beta weight of parenting predicting PMS, controlling for summary risk score**	**Beta weight of summary risk score predicting PMS, controlling for parenting**
HOME-SF Total	.28***	-.16*	.31***	-.16**	.22**	-.14*
HOME-SF Emotional Support subscale	.12	-.18*	.20**	-.17**	.21**	-.13+
HOME-SF Cognitive Stimulation subscale	.29***	-.14*	.27***	-.16**	.16*	-.13+

SOURCE: JOBS Descriptive Study data, control group members.
NOTES: Sample size = 200.
[1]Each analysis was conducted separately and is controlled for child sex and age.

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

Table 6a
Mean Scores on PPVT-R as a Function of Parenting and Risk for Limiting Condition

	Below Median	Above Median	p-level[a]	Significance of Effects
HOME-SF Total				Main Effect Risk: $p < .05$* Main Effect HOME-SF: $p < .01$** Interaction Effect: $p = .76$, ns
Low Risk	65.57 (88)	74.68 (77)	.001***	
High Risk	59.29 (18)	66.59 (15)	.19	
HOME-SF Emotional support				Main Effect Risk: $p < .05$* Main Effect Emotional Support: $p = .47$, ns Interaction Effect: $p = .42$, ns
Low Risk	67.20 (77)	72.19 (84)	.05*	
High Risk	62.37 (14)	62.05 (18)	.96	
HOME-SF Cognitive Stimulation				Main Effect Risk: $p < .05$* Main Effect Cognitive Stimulation: $p < .05$* Interaction Effect: $p = .34$
Low Risk	65.80 (104)	76.08 (55)	.001***	
High Risk	61.59 (24)	65.64 (9)	.50	

SOURCE: JOBS Descriptive Study data, control group.

NOTES: Total sample size=200. Cell sizes are listed within parentheses, and may not sum to 200 due to missing data.
Low Risk = 0 to 1 risk factors; High Risk = 2 or more factors.
Means and effects are adjusted for child sex and age.
[a]p-level column refers to significance for within risk group.
Below median means less favorable parenting; above median means more favorable parenting, across all measures.

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

Table 6b
Mean Scores on Caldwell Preschool Inventory as a Function of Parenting and Risk for Limiting Condition

	Below Median	Above Median	p-level[a]	Significance of Effects
HOME-SF Total				Main Effect Risk: p < .01** Main Effect HOME Emotional Support: p < .001*** Interaction Effect: p = .23, *ns*
Low Risk	15.21 (77)	18.32 (84)	.001***	
High Risk	11.38 (14)	16.92 (18)	.01**	
HOME-SF Emotional support				Main Effect Risk: p < .01** Main Effect Emotional Support: p < .05* Interaction Effect: .86, ns
Low Risk	15.47 (77)	17.62 (84)	.01**	
High Risk	12.59 (14)	15.15 (18)	.21	
HOME-SF Cognitive Stimulation				Main Effect Risk: p < .05* Main Effect Cognitive Stimulation: p < .01** Interaction Effect: .85, ns
Low Risk	15.42 (104)	19.00 (55)	.001***	
High Risk	12.91 (24)	16.93 (9)	.06	

SOURCE: JOBS Descriptive Study data, control group.

NOTES: Total sample size=200. Cell sizes are listed within parentheses, and may not sum to 200 due to missing data.
Low Risk = 0 to 1 risk factors; High Risk = 2 or more factors.
Means and effects are adjusted for child sex and age.
[a]p-level column refers to significance for within risk group.
Below median means less favorable parenting; above median means more favorable parenting, across all measures.

*** p < .001
** p < .01
* p < .05

Table 6c
Mean Scores on Personal Maturity Scale as a Function of Parenting and Risk for Limiting Condition

	Below Median	Above Median	p-level[a]	Significance of Effects
HOME-SF Total				Main Effect Risk: $p < .05$* Main Effect HOME: $p < .05$* Interaction: $p = .53$, ns
Low Risk	7.25 (88)	7.72 (77)	.06	
High Risk	6.51 (18)	7.34 (15)	.09	
HOME-SF Emotional support				Main Effect Risk: $p = .07$+ Main Effect Emotional Support: $p < .01$** Interaction: .38, ns
Low Risk	7.19 (77)	7.71 (84)	.05*	
High Risk	6.39 (14)	7.44 (18)	.06	
HOME-SF Cognitive Stimulation				Main Effect Risk: $p = .09$+ Main Effect Cognitive Stimulation: $p = .28$, ns Interaction Effect: .85, ns
Low Risk	7.31 (104)	7.22 (55)	.11	
High Risk	6.82 (24)	7.10 (9)	.63	

SOURCE: *JOBS Descriptive Study data, control group.*

NOTES: Total sample size=200. Cell sizes are listed within parentheses, and may not sum to 200 due to missing data.
Low Risk = 0 to 1 risk factors; High Risk = 2 or more factors.
Means and effects are adjusted for child sex and age.
[a] p-level column refers to significance for within risk group.
Below median means less favorable parenting; above median means more favorable parenting, across all measures.
*** $p < .001$
** $p < .01$
* $p < .05$