



Periodic Follow-up of Two Preventive Intervention Trials

1. SPECIFIC AIMS

This proposal seeks to extend through early adolescence an examination of normal and pathogenic development and the impact of two, universal, first grade, preventive interventions on the distal targets of substance abuse, antisocial behavior and anxious and depressive symptoms and disorders. We will build on the scientific value of an existing, prospective, developmental epidemiological data base involving a defined population of urban first-graders, whose psychological well-being (PWB) and social adaptational status (SAS) in the classroom, peer group, and family social fields have been assessed periodically from 1993 through 1997 (ages 6-10). This representative population of urban first graders is comprised of 678 children from 9 elementary schools in predominantly low to lower middle income areas in Baltimore. Within each of the nine schools, first grade children and their teachers were randomly assigned to either a standard setting (i.e., control) classroom or to a classroom featuring one of two theory-based, universal preventive interventions. Each intervention specifically targeted two confirmed antecedents of later psychiatric symptoms and disorders and substance use: 1) aggressive and shy behaviors, antecedents of later conduct problems, antisocial personality and substance abuse, and 2) poor school achievement, an antecedent of later anxious and depressive symptoms and possibly disorders (Kellam & Rebok, 1992). One intervention, the classroom-centered intervention (CC), sought to reduce the early risk behaviors of poor achievement and aggressive and shy behaviors through the enhancement of classroom curricula and teacher instructional and behavior management practices. The second intervention, the family-school partnership intervention (FSP), sought to reduce these early risk behaviors by improving parent-teacher/school mental health professional collaboration and by enhancing parents' teaching and behavior management skills.

Extension of the data set through ages 11-14 will (1) enable us to assess variation in the malleability of developmental paths as a function of the impact of the CC and FSP interventions and (2) the initial and evolving characteristics of the child and the family, classroom, peer group and neighborhood/community social fields (Institute of Medicine, Mrazek & Haggerty, 1994). Such knowledge should serve to inform the nature, targets, and timing of our future preventive and mental health services intervention efforts. (3) Follow-up through early adolescence will also allow us to examine the impact of the CC and FSP interventions in terms of the need for, use, and associated costs of child mental health and special education services; (4) We will also be in a position to assess the effectiveness of the interventions--particularly the FSP intervention--in reducing unmet need for child mental health and special education services; The importance of this question is highlighted by the work of Leaf et al. (1995) and others (Offord et al., 1987; Zahner et al., 1992), which suggest that only a minority of children in need of mental health services receive them. (5) Finally, we can also study the growth of substance use, antisocial behavior, and anxious and depressive symptoms and disorders through early adolescence, along with the corresponding need and unmet need for child and adolescent mental health and special education services.

This current set of preventive trials and its accompanying database builds on the foundation laid by the Johns Hopkins Prevention Intervention Research Center's (JHU PIRC) initial classroom-based, universal preventive intervention trials, which were fielded in 19 Baltimore City schools with two consecutive cohorts of first graders in the 1985-86 and 1986-87 school years. As with the current set of field trials, the focus was on the early risk behaviors of poor achievement and aggressive and shy behavior and their distal correlates of antisocial behavior, substance abuse and anxious and depressive symptoms. *The current field trials are unique from the original set of trials in a number of important ways. First, in addition to intervening with teachers in the classroom, we also intervened with the family. Thus, we can explicitly test our models of the contributions that families and family-school partnerships make to children's social adaptational status, psychological well-being, and, ultimately, to the need for and utilization of mental health services. Secondly, unlike our initial field trials in 1985-86, the design of this latest set of trials included a comprehensive assessment of theoretically relevant family characteristics and processes in 1st grade--similar family data were not available until 6th grade in the JHU PIRC's first set of field trials. Third, in the current field trials a comprehensive microsocial and psychiatric assessment of the child and family was carried out on a 25% stratified, random sample of participating children and their families. This second stage assessment included observations of parent-child interaction around learning and behavior management tasks as well as psychiatric interviews to determine parent and child psychiatric status and family history of substance use, dependence, and abuse. A separate application will be submitted to NIMH to continue studying this case base sample within the context of the follow-up of the larger population of children and families. Finally, in contrast to the 1985-86 JHU PIRC cohorts, whereas only one wave of caregiver reports of family characteristics and processes was collected, the proposed study will leave us with six waves of data on the family characteristics and processes hypothesized to influence normal and pathogenic development.*

The unique scientific opportunities the proposed study provides are reflected in our specific aims:

- 1. Modeling Malleability of Developmental Paths.* To model from entrance to first grade through early adolescence variation in developmental paths and mental health service need, unmet need, and utilization as a function of the early responses to the two preventive trials. This aim emphasizes the role of preventive interventions as experimental tests of elements of developmental theory and models. It incorporates intervention within the developmental models studied in Aim 2 in attempting to understand the malleability of processes that influence social adaptive capacity and psychological well-being, and the corresponding need for, use, and associated costs of child mental health and special education services.
- 2. Modeling Mediation and Moderation of Developmental Outcomes.* To model from entrance to first grade through early adolescence variation in social adaptational status, substance use, and psychological well-being as mediated or moderated by the evolving characteristics of the individual and of the social fields of the family, peer group, school, and neighborhood. This knowledge should then serve to inform the nature, targets, and timing of our future preventive and mental health services intervention efforts.
- 3. Modeling Developmental Psychopathology and Determining the Degree of Unmet Need for Children's Mental Health Services.* To model the development of psychopathology from the entrance to first grade through early adolescence--examining the antecedents and moderators of onset and course of psychiatric symptoms. In addition, to assess the incidence, prevalence, and comorbidity of emerging affective, antisocial, and substance abuse symptoms and disorders, which should serve to inform the field with respect to mental health service need amongst similar populations of urban, school-age children, along with the degree of unmet need.

2. BACKGROUND AND SIGNIFICANCE

The proposed work represents the next stage of our ongoing study of normal and pathogenic development and the impact of two, universal, first grade, preventive interventions on the distal targets of antisocial behavior, substance use and affective symptoms and disorders in early adolescence. This latest (1993-94) stage of our work builds on the results of the JHU PIRC's first (1985-86) set of preventive intervention trials, which involved an evaluation of two, classroom-based, preventive interventions, one targeting poor achievement and the other aggressive and shy

behaviors (Good Behavior Game, Dolan et al., 1993). Empirical support for directing interventions at these two maladaptive behavioral responses (poor academic achievement and aggressive and shy behavior) included findings from Woodlawn (e.g., Kellam et al., 1983; Ensminger, et al., 1983) and other studies that learning problems predict psychiatric distress, particularly depressed mood and depressive disorder (Kellam et al., 1983; Shaffer et al., 1979), whereas aggressive behavior, as early as first grade, predicts later antisocial behavior, criminality, and heavy substance use (Brook et al., 1986a; Elliot et al., 1985; Ensminger et al., 1983; Farrington & Gunn, 1985; Hawkins et al., 1992; Kellam et al., 1983; Robins, 1978). Further, in the Woodlawn studies, aggressive behavior interacted with shy behavior to increase the risk of later delinquency and substance use (Block et al., 1988; Ensminger et al., 1983; Farrington et al., 1988; Farrington & Gunn, 1985; Hans et al., 1991; Kellam et al., 1983; McCord, 1988; Schwartzman et al., 1985).

The results of the initial (1985-86) set of JHU PIRC trials yielded evidence that the proximal targets of poor achievement and aggressive and shy behavior were malleable (Dolan et al., 1993), and that change in the proximal targets was associated with change in the distal outcomes of antisocial behavior (Kellam et al., 1994a; 1994b) and substance use (Chilcoat et al., in preparation; Kellam & Anthony, in press). Yet we were not satisfied with either the magnitude or duration of the effects of these two universal interventions on their proximal or distal targets. Consequently, we fielded our second, and latest (1993-94), set of universal, first grade preventive interventions. In collaboration with our school system partners and based on the results of the previous trials, we significantly revised the two classroom based interventions--one targeted at aggressive and shy behavior and the other at poor achievement--in order to enhance their effectiveness. Given the results of Rebok et al. (1996), which suggested attention/concentration problems moderated intervention outcomes in the 1985-86 trial, the revised intervention protocol included a specific focus on reducing off-task behavior and improving self-regulation of attention. We then combined these two classroom interventions into one condition. The decision to combine the two stemmed from findings from our first set of trials. The academic intervention had impact on early achievement, but had only a modest to moderate crossover, or indirect, effect on aggression. Similarly, the intervention targeting aggressive and shy behavior had impact on aggressive and shy behavior, but not on achievement. Each intervention thus appeared to be specific to its own proximal target. Consequently, if we were to reduce the later risk for antisocial behavior, substance use and anxious and depressive symptoms and disorders, and the corresponding need for and use of child mental health and special education services, both aggression and achievement needed to be targeted.

In addition to combining the two classroom interventions in our latest (1993-94) set of intervention trials, we also developed and fielded a universal, family-school partnership (FSP) intervention to contrast with the combined classroom intervention. Like the classroom-centered intervention (CC), the proximal targets of the FSP intervention were poor achievement and aggressive and shy behaviors. The FSP intervention sought to reduce these early risk behaviors by enhancing family-school communication and parenting practices associated with learning and behavior. The decision to add a family-based component was consistent with existing theory and the considerable empirical evidence of the important influences that families exert on their children's academic success (Gallagher, 1987; Rutter, 1985; Sines, 1987; Scott-Jones, 1984) and social development (Kazdin, 1985; Patterson et al., 1992), and, the benefits of strong parent-teacher partnerships and parent involvement (Epstein, 1983; Henderson, 1987; Sattes, 1985) on children's behavior and achievement. The addition of a family based component was also consistent with the pioneering work of Hawkins and his colleagues in Seattle (Hawkins et al., 1992) and Reid et al. (submitted) at the Oregon Social Learning Center, where in both sites the feasibility and effectiveness of a universal family component, along with classroom-based preventive efforts, were demonstrated in elementary school.

Our work, as well as that of Hawkins and Reid's, are *complemented* by the universal efforts of Botvin et al. (1995) and Pentz et al. (1989) in the middle school years, the selective interventions described in Kumpfer et al. (1996) and Catalano et al. (in press), and indicated efforts such as Eggert's et al.'s (1994;1995). Indeed, in the schema elaborated in Kellam and Rebok (1992), we advocate a nested approach to preventive intervention programming across the life course. Complementary sets of universal interventions are implemented at critical points in development (e.g., the transition to elementary, middle, and high school) in that they are typically more economical than selective or indicated interventions and less likely to result in "labeling" effects. Selective and indicated interventions are then targeted at children who either fail to respond to the universal interventions, and/or have begun to demonstrate signs of disorder (Mrazek & Haggerty, 1994). The children who then fail to respond to the

selective or indicated efforts are routed to mental health services.

The benefits of such a nested approach are four-fold. First, if the preventive interventions prove effective, the strain on the mental health service system should be reduced. Second, a child's response to the preventive interventions, as opposed to risk factors measured at a point in time, could be used to more reliably and validly determine the need for more intensive intervention in the form of child mental health and/or special education services. Third, the impact of traditional child mental health services (e.g., clinic-based individual or family therapy) may be enhanced if the classroom teacher is a partner in the intervention. Training in a universal, classroom-based, preventive intervention such as the JHU PIRC's Good Behavior Game (Dolan et al., 1993) could serve to facilitate the link between teachers and child mental health clinicians. Fourth, if effective, a universal, classroom-based, preventive intervention should improve achievement and behavior at the classroom-level, thus allowing teachers more time to successfully intervene with those students at increased risk for academic failure and/or serious conduct problems. This should, in turn, reduce the burden on the limited school-based special education and mental health services available.

As to the proposed next stage of our work, extension of the evaluation of the 1993-94 JHU PIRC preventive trial through the middle school years will enable us to assess variation in the malleability of developmental paths as a function of the impact of the CC and FSP interventions and (2) the initial and evolving characteristics of the child and the family, classroom, peer group and neighborhood/community social fields. ***This knowledge should serve to inform the field as to (a)*** for whom these universal interventions work, **(b)** to what degree, **(c)** for how long, **(d)** in what contexts, **(e)** what else is needed in terms of mental health services or preventive interventions (e.g., selective interventions or indicated interventions), and **(f)** when in the elementary to middle school years should these additional interventions be implemented. (5) Continued study of the population will also enable us to assess the growth of substance use, antisocial behavior, and affective disorders during the middle school years, along with the corresponding need and unmet need for child mental health and special education services. (6) We will also be in a position to study the antecedents and the moderators of the growth of these symptoms and disorders over the transition to adolescence.

2.1 The Life Course/Social Fields Framework Guiding the Research

The JHU PIRC's conceptualizations of normal and pathologic development and, in turn, the choice of our preventive interventions and their proximal and distal targets have been guided by the *life course/social field* framework (Kellam & Rebok, 1992). This *framework* focuses on the measurement within epidemiologically defined populations of early maladaptive responses to social task demands that increase the risk of mental disorders over the life course. Central to *life course/social field* theory is the concept that individuals face specific social task demands in various social fields across the major *periods* of the life span (Kellam & Rebok, 1992; Connell & Furman, 1984). The social task demands the individual confronts are defined by individuals in each social field whom we have termed the *natural raters*. The natural rater not only defines the tasks but rates the individual's performance in that social field. Parents function as natural raters in the family, peers in the peer group, and teachers in the classroom (Kellam, 1990; Kellam et al., 1975; Kellam & Ensminger, 1980). This interactive process of demand and response is termed *social adaptation*, and the judgments of the individual's performance by the natural raters *social adaptational status (SAS)* (Kellam et al., 1975). In line with the organizational approach to development (Cicchetti & Schneider-Rosen, 1984), normal development is viewed within the life course/social fields framework as marked by the integration of earlier competencies into later modes of function, with the earlier competencies remaining accessible, ready to be activated and utilized during times of stress, crisis, novelty, and creativity. ***It follows then that early successful social adaptation (SAS) in the face of prominent developmental challenges tends to promote later adaptation as the individual traverses the life course and encounters new and different social task demands across the main social fields*** (Cicchetti & Schneider-Rosen, 1984). This key developmental principle along with a growing empirical literature, forms the basis for the JHU PIRC's focus on successful adaptation to first grade as means as a means of improving social adaptational status over the life course.

In contrast to social adaptational status (*SAS*), *psychological well-being (PWB)* in the life course/social field framework refers to the individual's internal state, as reflected in anxious and depressive symptoms. We hypothesize

that PWB and SAS are intimately related, such that PWB is in large part determined by the degree to which the individual is successful in meeting the demands of her natural raters. Our conceptualization of the link between SAS and PWB is grounded in the basic principles of social learning theories of depression. The more successful an individual is in meeting the demands of her natural raters the more likely she will be reinforced for their successes. Alternatively, failure to meet the demands of the natural raters will be associated with reductions in reinforcement and increased punishment, which may then lead to decrements in psychological well-being. This hypothesized link between SAS and PWB provides an additional rationale for targeting early SAS as means of not only improving subsequent SAS, but reducing the risk for decrements in psychological well-being (PWB) and early and sustained substance use as well.

2.2 Hypothesized Impact Mechanisms for the Intervention Components Targeting the Early Antecedent Risk Behaviors of Aggressive and Shy Behavior and their Distal Correlates

The integration of our life course/social fields perspective and Patterson, Reid, & Dishion's (1992) model of the development of antisocial behavior and substance use provides the theoretical basis for the intervention components targeting the early antecedent risk behaviors of aggressive and shy behavior and their distal correlates. According to Patterson and colleagues, a major pathway to antisocial behavior, substance use and depression in adolescence begins in the toddler years, when parental success in teaching their child to interact within a normal range of compliance and aversive behavior is a prerequisite for the child's development of social survival skills (Patterson, 1986). Alternatively, the parents' failure to effectively punish coercive behavior during these formative years and to teach reasonable levels of compliance comprises the first step in a process which serves to "train" the child to become progressively more coercive and antisocial. In the classroom setting, such children prove difficult for teachers or peers to "teach" appropriate forms of social interaction and problem solving. Moreover, their coercive style may be further reinforced in the presence of inconsistent and coercive teacher disciplinary practices. Ultimately, the coercive child is rejected by parents, teachers and normal peers, which results in the child's failure to develop academic, social, and occupational "survival" skills. That is, the opportunities to learn these skills through interaction with teachers, parents, and peers are greatly reduced due to the rejection. Patterson et al. (1992) argue that the lack of adequate monitoring by parents in early adolescence, and rejection by teachers and mainstream peers, precipitates "drift" into a deviant peer group, wherein a wide array of antisocial and delinquent behavior, including alcohol and drug use, may be reinforced. Concomitantly, the opportunities for obtaining positive reinforcement from these mainstream natural raters--parents, teachers, and well-adjusted peers--are significantly reduced. In turn, the coercive child will be more likely to use substances as a means of obtaining reinforcement and negating the reductions in reinforcement dispensed by the mainstream natural raters. Relatedly, the lack of positive reinforcement received from mainstream natural raters may lead to decrements in psychological well-being (Capaldi, 1991; 1992), which the child seeks to alleviate through substance use (Chen et al., submitted).

In keeping with our life course/social fields perspective and its integration with Patterson et al.'s (1992) model, the CC and FSP interventions are hypothesized to reduce the early antecedent risk behaviors of aggressive and shy behavior and their distal correlates in the following manner: **(1)** The CC and FSP interventions should improve teachers' and parents' disciplinary practices, respectively, which should then result in a reduction of the early antecedent risk behaviors of aggressive and coercive behavior at the level of the child and the classroom; **(2)** As a result of the reduction in aggressive behavior at the level of the classroom, there should be fewer opportunities for the child to learn inappropriate behavior through modeling of their classmates' aggressive behavior; **(3)** The child should then be at decreased risk of being rejected by parents/caregivers, teachers and peers; **(4)** Moreover, parents should be more likely to monitor and supervise their child and engage in jointly reinforcing activities with them; **(5)** As a result, the child should be less likely to drift into a deviant peer group, where antisocial behavior and substance use may be reinforced; **(6)** Ultimately, the child would be less likely to fail in the classroom, family, peer, and intimate relations social fields in late childhood and early adolescence; **(7)** Thus, s/he would be at reduced risk for decrements in psychological well-being; **(8)** The child would also be at reduced risk for early and sustained substance use, given their high level of psychological well-being and the ample opportunities for positive reinforcement from their mainstream natural raters. **(9)** Finally, the corresponding need for and use of child mental health and special education services should be reduced.

2.3 Hypothesized Impact Mechanisms for the Intervention Components Targeting the Early Antecedent Risk Behavior of Poor Achievement and its Distal Correlates

The CC and FSP interventions are hypothesized to reduce the early antecedent risk behavior of poor achievement, its distal correlates, and the corresponding need for and use of child mental health and special education services in the following manner: **(1)** The CC and FSP interventions should improve teachers' and parents' instructional practices and parent support and involvement for children's academic achievement, respectively; **(2)** Child achievement should then improve along with the classroom's overall level of achievement; **(3)** As a result of the overall improvement in classroom academic achievement, there will be a greater number of academically successful children in the classroom for their classmates to model, which may result in increased academic effort and achievement; **(4)** Success in the achievement domain over the elementary school years should result in greater perceptions of personal control and increased perceived competence in the scholastic domain during the late elementary and middle school years; **(5)** This should then set the stage for improved psychological well-being and success in meeting the increasing academic demands of the classroom in the pre- and early adolescent years; **(6)** Relatedly, children who succeed academically should be less likely to engage in disruptive and off-task behavior, which should then reduce the risk of their being rejected by teachers, parents and peers. **(7)** Consequently, these children may be more likely to develop the social survival skills necessary for success in the classroom, peer group, and family social fields. **(8)** They will also be less likely to drift into a deviant peer group, where antisocial behavior and substance use may be reinforced (Brook et al., 1989; Jessor, 1978; Hirschi, 1969; Patterson et al., 1992). **(9)** Ultimately, the corresponding need for, use, and associated costs of child mental health and special education services should be reduced.

2.4 Hypothesized Intervention Impact Mechanisms: The Role of Family-School Partnerships in Help-Seeking and Utilization of Children's Mental Health and Special Education Services

Consistent with Henderson (1987) and Sattes' (1985) extensive reviews of the literature and Epstein's (1983) work on parent-school partnerships, we expected that the efforts aimed at parent-school communication and collaboration in the FSP intervention would result in a reduction in unmet need for child mental health and special education services. First, in light of the collaborative relationship established between parents and school personnel (i.e., teachers, principals, and school mental health professionals), we theorized parents would be more aware of their child's mental health and educational needs and the services available to deal with them. In turn, parents would be more likely to seek services when necessary. Second, we hypothesized that children in need of school-based mental health and/or special education services might be more readily identified as result of greater collaboration between the teacher and the school mental health professional(s). Finally, as a result of a strong family-school partnership, school staff might be more likely to assist parents in obtaining needed services.

2.5 Variation in Intervention Response & Developmental Course: Hypothesized Sources and Mechanisms

Aim 2 represents our central interest in understanding the factors operating at the level of the child, family, peer group, school, and neighborhood that contribute to variation and malleability in developmental paths and intervention outcomes. *Such knowledge should serve to inform the nature, targets, and timing of our future preventive and mental health services intervention efforts.* In Sections 2.6-2.11, we highlight how these factors might operate to produce variation in developmental paths and intervention response. Although the hypothesized moderators/mediators of intervention impact are discussed separately for simplicity of presentation, consistent with our life course/social fields framework, we hypothesize a dynamic interplay amongst these moderators/mediators within and across the social contexts of family, peer group, classroom, school and neighborhood. **Importantly**, our universal interventions were designed to target two putative pathways to antisocial behavior, substance use and anxious and depressive symptoms and disorders. We assume that there are considerably more pathways to these public health problems, which do not involve early aggression or poor achievement. Consequently, it is quite likely that our interventions will be most successful for those children whose pathways to these problems are through poor achievement and/or aggressive and shy behaviors.

2.6 Variation in Intervention Response and Developmental Course as a Function of the Pretest or Baseline

Level of the Early Antecedent Risk Behaviors of Poor Achievement and Aggressive and Shy Behavior

In a universal intervention trial with an unselected, community population of young children such as ours, we expect that intervention response will vary as a function of the pretest or baseline level of the early antecedent risk behaviors targeted: Such that the children who manifest mild to moderate elevations in the early antecedent risk behaviors of aggressive and shy behavior and poor achievement at pretest are the ones most likely to benefit from the interventions. Our rationale for this hypothesis is three-fold. First, for children at the extreme low end of the achievement distribution or the high end with respect to aggressive and shy behavior, it's quite likely that they would be best served by a selective or indicated intervention *nested within a universal*, given that they may be at the disorder or presyndromal stage. Moreover, as our data (Kellam et al., 1991) suggest, children at the presyndromal or disorder stage are also likely to have a number of comorbid features that may attenuate response to the universal intervention, including chronic family adversity and high levels of concentration problems and hyperactivity. A second reason for expecting variation in intervention response as a function of the pretest level of the early antecedent risk behaviors is that the great preponderance of children will not be aggressive or shy or poor achieving. Consequently, these asymptomatic children are less likely to derive *immediate* benefits from the interventions in terms of reductions in the early risk behaviors of poor achievement and aggressive and shy behavior. In essence, you have to be exposed to the risk factor to benefit from the preventive intervention. A third and final reason is that consistent with our *life course social fields perspective and the organizational approach to development*, the level of success or competence attained at an earlier stage of development will set the stage for subsequent success in meeting future developmental challenges. That is, the more skills one has acquired at an earlier point in development, the better prepared they will be to respond to new and increasingly more difficult task demands at a later stage in development, *or to a preventive intervention designed to foster their success in meeting those demands*. For example, children who have acquired the concept of number would be in a better position to take advantage of a universal intervention aimed at facilitation of simple calculation skills than those who lacked this basic concept. *Importantly, however*, children whose calculation skills were well in advance of their peers would probably show little or no benefit from such a universal intervention, given they can already add and subtract.

2.7 Variation in Intervention Response and Developmental Course: The Contribution of Child Characteristics

There are a number of child characteristics that may influence response to the interventions and developmental course in general, *particularly with respect to psychological well-being*. First, and perhaps foremost, is the *child's perception of self-competence* in the social fields targeted in the interventions. Success in meeting the academic demands of the classroom social field may have no beneficial effect on a child's psychological well-being if he perceives himself as doing poorly academically. Moreover, the stimulus valence (Mischel, 1973) of a particular outcome may also serve as a source of variation in intervention response. If a child perceives academic achievement as unimportant to how they feel about themselves as a person (i.e., self-worth), success or failure in the academic domain may have little or no impact on psychological well-being. *Control beliefs (Weisz, 1986) may also moderate the relationship between SAS and PWB*. The greater the sense of *a lack of personal control* over outcomes of high stimulus valence in the scholastic, behavioral, and relational domains, the less likely the child will make a sustained effort to succeed in these domains, resulting in poorer intervention response.

Concentration problems and shy behavior may also influence the level and duration of intervention response. For example, in the absence of normal levels of social participation, the shy aggressive child may have fewer opportunities to learn through interaction with adults and peers the academic and social problem solving skills essential for success in the classroom, peer group, and family social fields. Consequently, they may have a poorer response to the interventions, which would leave them at increased risk for antisocial behavior, early and sustained substance use, and anxious and depressive symptoms in the middle school years. Similarly, concentration problems may serve to undermine intervention response in the classroom social field by reducing on task time and disrupting the encoding of task relevant information into memory (Rebok, et al., 1995). Concentration problems may also reduce intervention response by disrupting the process of encoding social cues essential to social problem solving and conflict resolution with adults and peers.

2.8 Variation in Intervention Response and Developmental Course: The Contribution of Family Characteristics

Among the family characteristics or factors that we hypothesize to influence intervention response are chronic family adversity or life stress (e.g., economic hardship, physical or mental health problems, and major and minor life events) (Brook et al., 1986b). For example, as a result of coping with such stressors, parents may react in a more irritable and coercive fashion with their child, which, in turn, triggers an increase in the child's frequency and/or amplitude of irritable responses (Patterson et al., 1992). Thus, the coercive cycle between parent and child is strengthened, which increases the likelihood the child will employ coercion in the classroom and peer group. Intervention response may then be attenuated as a result. Relatedly, these irritable exchanges may also make parent engagement in home learning activities more aversive for both parent and child and, thus, precipitate a decrease in parent support and involvement in child learning. Subsequently, response to the academic components of the FSP and CC interventions may be diminished.

2.9 Variation in Intervention Response & Developmental Course: Peer, School, Neighborhood Characteristics

The above discussion centered largely on factors operating within the child and family that may come to influence intervention response. However, it is also important to consider determinants arising from the broader urban environment in which the schools, families, and school children are embedded. For example, Kellam et al. (1992) demonstrated that the level and duration of response to intervention may vary as function of the *characteristics of the child's classmates and of the classroom and school*. If the prevailing behavior in the classroom is disruptive and aggressive, aggression may be tolerated to a greater degree by both teachers and peers and, therefore, go unpunished. As a result, the likelihood of future acts of child aggression may be increased and intervention response reduced. As a further example of the potential impact of classroom/school characteristics on intervention response, large class sizes may serve to reduce teachers' capacity to adequately and consistently monitor and discipline each of their students. Moreover, either of the above--high rates of disruptive behavior and/or large class sizes--may result in teachers spending less time on rehabilitative work with students who are falling behind academically and/or who are aggressive and shy. *At the level of neighborhood*, the effect of the CC and FSP interventions on later antisocial behavior and early initiation and course of substance use may be modified by the extent of neighborhood adolescent criminal activity, prevalence of substance use, or, in general, by the presence of a deviant peer group in the neighborhood (Brook et al., 1989). In neighborhoods with high levels of drug use, there is likely to be greater availability of substances which may increase the risk of use (Johnston et al., 1995; National Household Survey of Drug Abuse, 1995).

2.10 Variation in Intervention Response & Developmental Course: The Contribution of Gender

Gender may also serve to influence intervention response. *Common to each of these gender specific mechanisms is the fact that our prevention interventions did not directly target them. Thus, we may see variation in intervention response as a result.* One of these potential mechanisms centers on the cost of caring hypothesis as elaborated upon by Kessler et al. (1984), and which was recently supported by Gore et al (1993) with adolescents. According to the cost of caring hypothesis, women may be at greater risk for depression than men because women may be more likely to be distressed by an intimate other's adversity, in addition to their own. Support for the relevance of the cost of caring hypothesis to the pre- and early adolescent years is reflected in the literature on the evolution of interpersonal relationships from middle childhood to middle adolescence. Intimacy becomes an increasingly sought after commodity in friendships during this period (Buhrmester, 1990; Furman & Burhmester, 1992). Although adolescent boys as well as girls experience the increased intimacy with and commitment to friends, girls report more frequent interactions with same sex friends than boys do, and they have more intimate knowledge of their friends (Collins & Repinski, 1994). Relatedly, Richards & Larson (1989) in summarizing the research on the daily life experiences of adolescents conclude that, in contrast to boys, girls spend most of their time in interpersonal contexts, involving caring and connection with others (Peck, 1986). More direct evidence of the applicability of the cost of caring hypothesis is provided by Gore et al. (1993), who report that "...girls' interpersonal caring orientation and involvement in the problem of significant others accounts for 25% of gender differences in distress" (Gore et al., 1993, p. 101). Consequently, in accord with the cost of caring hypothesis, intervention response may be poorer in

girls in terms of anxious and depressive symptoms in adolescence.

A second hypothesis concerning the potential for gender differences in intervention impact in early adolescence is that puberty in girls is associated with a greater number of, and more pronounced, changes in physiognomy than in boys (Simmons & Blyth, 1987). Moreover, these changes are more likely to be co-occurring for girls with other stressful transitions and life events common to early adolescence (Coleman, 1979, 1989; Peterson et al., 1991), including the transition to middle school and entrance into the romantic relations social fields, where one's physical appearance may be perceived as highly predictive of one's chances of success. As such, given the simultaneous nature of these pronounced pubertal changes and the normative life events typically associated with the transition to middle school, this period of the life course may be more stressful for girls than boys (Simmons & Blyth, 1987). Thus, girls may be at greater risk for anxious and depressive symptoms than boys in the early adolescent years, which may translate into a poorer intervention response in terms of psychological well-being.

2.11 Variation in Intervention Response & Developmental Course: The Transition to Middle School

The transition to middle school and early adolescence brings with it a unique and rapid confluence of change in the characteristics of the child and the family, peer group, classroom and neighborhood social fields. This confluence of change may have important implications for intervention response. For example, the rate at which children mature through puberty may serve to influence intervention response in transaction with neighborhood characteristics. Early maturing boys--with respect to pubescence--appear to be at an advantage in terms of peer acceptance and academic achievement relative to late maturing boys (e.g., Duke et al., 1982). However, it is possible that in schools and neighborhoods dominated by older deviant youths, late maturers may have the advantage in that the older deviant youths may be less likely to recruit them into antisocial activity. Consequently, late maturing boys may have a better long term response to the interventions in terms of the distal outcomes of antisocial behavior and substance abuse. Late maturing girls may have a similar advantage in terms of recruitment into antisocial activity by older and deviant youths. They may also be less likely to become the sexual prey of older boys and/or men. Thus, they may avoid the complications of teen pregnancy and its impact on psychological well-being and academic and occupational success.

2.12 Adding to Our Knowledge Base on the Nature, Onset, and Course of Psychiatric Disorders in Urban School Children and the Degree of Unmet Need for Child Mental Health and Special Education Services

As Bird's (1996) review suggests, there have been relatively few longitudinal studies of the nature, onset, and course of psychiatric disorder in community populations of economically-disadvantaged, urban school children. Perhaps even rarer are studies which allow the testing of prominent theoretical models of normal and pathological development in the context of determining the incidence and prevalence of psychiatric morbidity in child and adolescent populations. The proposed study would allow us to accomplish both of these goals. Indeed, within the context of studying the impact of the interventions over the eight-year course of the elementary and middle school years, we will be able to identify the confluence of factors operating at the level of the child and the social fields of family, peer group, classroom, school and neighborhood that serve as antecedents and moderators of the onset and course of antisocial, substance abuse and anxious and depressive disorders. Moreover, the experimental nature of the study allows us to more precisely test the putative role of these antecedents and moderators in accord with the life course/social fields framework and its integration with Patterson et al.'s (1992) model of the development of conduct disorder, substance abuse and depression. This knowledge should then serve to inform the nature, targets, and timing of our preventive and mental health services intervention efforts. Finally, we will be able to determine the degree of unmet need for child mental health and special education services in this economically disadvantaged population of urban school children, and, thereby, add to the work of Leaf et al.(1996) and others (Offord et al., 1987; Zahner et al., 1992), which suggest that only a minority of children in need of mental health services receive them. In assessing need and unmet need, we have the advantage of a longitudinal design with yearly measurement occasions which should allow us more precise measurement of service use and need than the frequently used cross-sectional designs.

3. PROGRESS REPORT AND PRELIMINARY STUDIES

In this section we summarize the knowledge accrued by the JHU PIRC relevant to the measurement of intervention impact, variation in impact, the nature, onset and course of antisocial behavior, substance use and anxious and depressive symptoms, and the development of state of the art methods for analyzing the results of preventive intervention trials. All of which provide a basis for realizing the aims of the proposed research. *Note that the JHU PIRC publications and results described below reflect only those which are pertinent to this proposal.*

3.1 PEER REVIEWED JOURNAL ARTICLES

Albert, P.S., & Brown, C.H. (1991). The design of a panel study under an alternating Poisson process assumption. Biometrics, *47*, 921-932.

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Brown, C.H. (1990). Protecting against nonrandomly missing data in longitudinal studies. Biometrics, *46*, 143-155.

Brown, C.H. (1994). Analyzing Preventive Trials with Generalized Additive Models. American Journal of Community Psychology (Special issue on Methodological Issues in Prevention Research), *21*, 635-664.

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Crum, R.L., Lillie-Blanton, M., & Anthony, J.C. (1996). Neighborhood environment and opportunity to use cocaine and other drugs in late childhood and early adolescence. Drug & Alcohol Dependence, *43*, 155-161.

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Ialongo, N., Edelsohn, G., Werthamer-Larsson, L., Crockett, L., & Kellam, S. (1996). Cognitive and social

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Ialongo, N., Edelsohn, G., Werthamer-Larsson, L., Crockett, L., & Kellam, S. (1994). The significance of self-reported anxious symptoms in first grade children. Journal of Abnormal Child Psychology, 22, 441-456.

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Johanson, C., Duffy, F., & Anthony, J. (1996). Associations between drug use and behavioral repertoire in urban youths. Addictions, 9, 523-534.

Kellam, S. & Anthony, J. (in press). Targeting early antecedents to prevent tobacco smoking: Findings from an epidemiologically-based randomized field trial. American Journal of Epidemiology.

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3.2 MANUSCRIPTS SUBMITTED

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Borges, J., Arria, A., & Anthony, J.C. An epidemiologic study of drug involvement and other suspected risk factors for attempts of self-harm in a population of middle school children.

Brown, C.H., & Zhu, Y. Compromise solutions to inferences with nonignorable missing data.

Chen, L., Crum, R.L., & Anthony, J.C. Cognitive self-competence, depressive symptoms, and the incidence of alcohol related problems.

Crijnen, A.A.M., Feehan, M., & Kellam, S.G. The course and malleability of reading achievement in elementary school: The application of growth curve modeling in the evaluation of a preventive intervention.

Crum, R.L., Lillie-Blanton, M., & Anthony, J.C. The likelihood of smoking among African-American elementary school children with low self-esteem.

Feehan, M., Crijnen, A., & Kellam, S.G. Evaluation of a preventive intervention targeting aggressive behavior in childhood: the standard error of measurement as a criterion for individual change.

Khoo, S.T. Assessing intervention effects in the presence of treatment-baseline interactions: A latent curve approach.

Mayer, L. & Warsi, A. Attributable risk and prevented fractions in a discrete mediational model.

Poduska, J., Reilly, A., Ialongo, N., Leaf, P., & Kellam. The factors associated with parents' perceptions of need for

mental health and educational services.

Wang, S., Brown, H., Liao, J., Zhu, Y., Ialongo, N., & Kellam, S. Examining impact of level of participation in a randomized preventive trial: Missing data approach.

Warsi, A., Mayer, L., & Reiser, M. Confounding in an intermediate variable model.

3.3 MANUALS

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3.4 SYNOPSIS OF THE RESULTS FROM INITIAL JHU PIRC TRIALS WHICH FORMED THE FOUNDATION FOR THE LATEST (1993-94) JHU PIRC TRIALS

3.4.1 An Overview of the Design of the Initial (1985-86) JHU PIRC Preventive Intervention Trials. As indicated above, the design of the initial JHU PIRC trials involved two consecutive first-grade cohorts in 19 Baltimore City Public Schools. Schools were randomly assigned to one of three intervention conditions: standard setting, or control, Mastery Learning (ML), or Good Behavior Game (GBG). The ML intervention targeted the early risk behavior of poor school achievement, whereas the GBG targeted early aggressive and shy behaviors. Classrooms not receiving any interventions were included as internal controls. Within each intervention school, children and teachers were randomly assigned to classrooms.

3.4.2 Summary of the Findings from the Initial (1985-86) JHU PIRC Trials Relevant to the Latest (1993-94) Field Trials. The results of the initial trial confirmed that (1) the proximal antecedent risks behavior of early aggression and poor achievement--which represent two of the salient social task demands faced by children in the early elementary school years--are malleable (Dolan et al., 1993) and that change in these proximal targets is associated with change in their distal outcomes of later social adaptational status, psychological-well being and early substance use (Chilcoat et al., in preparation; Kellam, et al., 1994a; 1994b; Kellam & Anthony, in press); (2) Intervention impact varied as a function of the pretest or baseline level of the early antecedent risk behaviors targeted, such that children who demonstrated mild to moderate levels of risk benefitted the most; (3) Though there was little evidence of cross-over effects from improving aggression to improving achievement, we did find evidence of a crossover effect from improved academic achievement to aggression. The effect was a moderate one and suggested that we needed to directly target both aggression and academic achievement in future preventive interventions; (4) Children's concentration problems were found to have a central role in the development of aggressive and shy behavior as well as poor achievement. In addition, concentration problems played a significant role in moderating the intervention impact of the GBG, thus, suggesting the need for preventive intervention components aimed at concentration problems; and (5) variation in intervention response and/or developmental course was associated with a number of family processes and characteristics as well as the initial and evolving

characteristics of the child, classroom, peer group, and neighborhood community social fields. These results pointed to the family as a further target for intervention, along with the need for continuing universal interventions in the classroom and peer group.

3.5 PROGRESS TOWARD THE SYSTEMATIC EVALUATION OF THE 1993-94 JHU PIRC INTERVENTIONS

3.5.1 Overview of the Latest (1993-94) JHU PIRC Field Trials

Our latest (1993-94) intervention field trials were built upon the foundation laid by the initial (1985-86) JHU PIRC trials and involved the enhancement and combination of the first grade classroom-based interventions (the Good Behavior Game and Mastery Learning) employed in the initial trials. It also included a family-school partnership intervention directed at improving school achievement and improving aggressive and shy behaviors by enhancing family-school communication and parenting practices associated with learning and behavior (see Appendix B for intervention manuals). The rationale for the choice of these interventions and their targets was elaborated above (Section 2).

Subjects, Design, and Measures. A total of 678 children and families participated, of which 97% consented to participate in the evaluation of the program (See Section 5 for more details). The evaluation battery consisted of structured teacher, parent, and child interviews and peer nominations. Grades, standardized achievement scores, and attendance data were also extracted from school records. A randomized block design was employed, with schools serving as the blocking factor. Three first grade classrooms in each of nine, urban elementary schools were randomly assigned to one of the two intervention conditions or a control condition. Teachers and children were randomly assigned to intervention conditions. ***The interventions were confined to first grade only. No additional intervention services were provided once the children completed the first grade year.***

The Classroom Centered Intervention (CC). The CC intervention consisted of three components: (1) curricular enhancements; (2) improved classroom behavior management practices; and (3) supplementary strategies for children not performing adequately. An interactive read aloud component was added to increase listening and comprehension skills. Readers Theater and journal writing were added to increase composition skills, whereas the Critique of the Week was added to increase critical thinking skills. The existing mathematics curriculum was replaced with the Mimosa math curriculum, a whole language approach to the development of mathematics skills. The class was divided into three small heterogeneous groups, which provided the underlying structure for the curricular and behavioral components of the intervention. Current behavior management practices were enhanced by the Good Behavior Game (GBG) (Barrish et al., 1969), which, as described above, had been successfully employed in 1985-86 JHU PIRC field trials and involves a whole class strategy to decrease disruptive behavior. In this latest (1993-94) set of JHU PIRC field trials, we refined the GBG to include a focus on off-task and inattentive behaviors in line with the results of Rebok et al.(1996). Children are assigned in the GBG to one of three heterogeneous groups in the classroom and points are taken away from the team for precisely defined off-task and shy and/or aggressive behaviors. Teachers were provided supplementary strategies directed at children who failed to respond to the GBG and/or to the curricular enhancements. The strategies employed with respect to academic non-responders included individual, or small-group tutoring, and modifications in the curriculum to address individual learning styles. The modifications made to the Good Behavior Game to address non-responders included making the non-responders team leaders, thus, creating an opportunity for more positive attention from teachers and peers. If the child continued to respond poorly, an additional GBG team would be created in which s/he was the only member. In this way the links between behavior and rewards and punishments were more direct and, thus, easier to learn. **Details of the CC intervention protocol are included in Appendix B. Appendix C contains a detailed discussion of the costs and portability of the interventions.**

The Family-School Partnership Intervention (FSP). The family-school partnership intervention (FSP) was designed to improve achievement and reduce early aggression and shy behavior by enhancing parent-school communication and providing parents with effective teaching and child behavior management strategies. The major mechanisms for achieving those aims were (1) training for teachers/school mental health professionals and other

relevant school staff in parent-school communication and partnership building (Canter & Canter, 1991), (2) weekly home-school learning and communication activities, and (3) a series of 9 workshops for parents led by the first grade teacher and the school psychologist or social worker. The workshop series for parents began immediately after the pretest assessments in the Fall of first grade and ran for 7 consecutive weeks through early December. Two follow-up or booster workshops were held in the winter and spring, respectively. The initial parent workshops aimed at establishing an effective and enduring partnership between parents and school staff and set the stage for parent-school collaboration in facilitating children's learning and behavior. Subsequent workshops focused on improving parents' teaching skills and support for their child's academic achievement. The Parents and Children series, a videotape modeling group discussion program (Webster-Stratton, 1984), formed the basis for the positive discipline component of the intervention. A voice mail system was also put in place to maintain parent involvement and provide consultation as needed with respect to learning or behavior management difficulties. To further foster family-school communication, parents were asked to fill out and return the comment sheets indicating whether they completed the assigned weekly home school learning activities and if any problems were encountered. **Details of the FSP intervention protocol are included in Appendix B, whereas Appendix C contains a discussion of costs and portability.**

Intervention Fidelity. To monitor and sustain the integrity of the CC and FSP interventions, the following steps were taken. The training and intervention manuals were precisely delineated and codified, thus, standardizing the content of each training and intervention contact. In addition, each intervener had a number of materials available designed to foster correct execution of the interventions, including detailed outlines and checklists that prescribe the necessary materials for each intervention contact, the specific themes or tasks that need to be covered, and related information. Finally, the intervener had extensive training prior to the initiation of the interventions and received ongoing supervision, feedback, and training throughout the intervention period. In terms of implementation and/or participation checks specific to each intervention, the monitoring of fidelity of implementation for the CC intervention involved three parts: (1) measures of setting up the classroom; (2) classroom observations; and (3) classroom visit record reviews. In terms of methods and measures of implementation and participation for the FSP, interveners were required to provide documentation of each contact with parents, including workshop attendance, level of participation and compliance with "homework assignments". Parents involved in the FSP intervention anonymously reported on their implementation and the usefulness of the techniques taught, and were also asked to report on the family interveners' interpersonal and teaching skills. The weekly parent comment sheets sent home with each of the Fun Math and Read Aloud activities served as indicators of parent participation in the weekly learning activities. Workshops were audiotaped to determine the extent to which the intervention protocols were being adhered to and well administered.

3.5.2 ANALYTIC PLAN. With respect to the results from our latest (1993-94) JHU PIRC trials, we have divided the analyses into two sets: (1) "intent to treat" and (2) implementation and/or participation analyses. Given space limitations, we present only the intention to treat analyses, with the exception of the achievement analyses, which highlight the variation in intervention impact as a function of the level of implementation. Appendix D contains a paper (Ialongo et al., in press) which provides a more comprehensive description of the proximal impacts of the interventions. Mixed model (i.e., random coefficient, Gibbons et al., 1988; Hedeker, 1994) analysis of covariance is used to describe the overall impact of the interventions on their proximal targets. In these analyses, school is treated as a complete randomized blocking factor, with classroom being the unit of randomization. Our use of the mixed model and the inclusion of school as a random effect insured that the test of the intervention main effect was at the level of randomization (i.e., classroom within school). Planned comparisons are performed between the CC intervention and controls and the FSP intervention and controls. All of these analyses examine the impact of the interventions after adjustment for the pre-test or baseline level of the early antecedent risk behaviors of poor achievement and aggressive and shy behavior. Inclusion of the baseline level in these analyses allows an examination of whether intervention impact varies as a function of the pre-test level of the targeted early risk behaviors. Lowess, a non-parametric smoother, is used as an aid in explicating the interaction between the pre-test level of the targeted risk behavior and intervention condition. While lowess provides an excellent graphical method for displaying where intervention impact varies, it does not automatically provide clearly definable statistically significant regions of differential intervention impact. To identify those baseline levels which have statistically

significant differential impact, we rely on bootstrapped lowess confidence regions. To gauge the magnitude of intervention impact, effect sizes are also reported in terms of unadjusted standard deviation units. When the outcome was categorical, logistic regression was used with school included as a random effect.

For the implementation/participation analyses, CC classrooms were identified as either high or low implementing, based on scores obtained from the three-phase CC implementation measurement procedure described above. Planned comparisons were then carried out between the control and CC High and Low conditions. For the FSP achievement implementation/participation analyses, we used the number of weekly, take-home Fun Math and Read Aloud activities completed. Completed Read Aloud and Fun Math activities represented the closest fit theoretically to the goals of the FSP intervention with respect to achievement. For analytic purposes, the number of activities was divided into tertiles: Low, Medium, and High. As with the CC implementation analyses, planned comparisons were made between the control group and the FSP Low, Medium and High conditions, respectively.

3.5.3 Impact of the CC Intervention on the Proximal Target of Poor Achievement. *With respect to boys' achievement,* we found a significant main and intervention X baseline interaction for the CC High condition in terms of boys' first grade reading achievement. Lowess curves revealed that the average effect size (ES) for the CC High boys versus control comparison was 17 National Curve Equivalents (NCEs; .80 SD) across the band of greatest impact (40-60th NCEs)--***a large effect according to Cohen (1988)***. In terms of boys' Spring of second grade reading achievement scores, the CC High main effect proved significant, whereas the intervention X baseline interaction fell just short of significance ($p < .06$). An examination of the lowess curves suggests the greatest impact was for those boys who scored above the 40th NCE in the Fall of first grade, with an average effect size across the band of impact of .62 SD. With respect to boys' math achievement, we found a significant CC High X Baseline interaction effect in first grade, whereas both the CC High main and CC High X Baseline proved significant in second grade. A significant main effect was found in third grade along with a CC High X Baseline interaction that approached significance. In first grade, lowess curves revealed that boys in the CC High condition whose Fall of first grade math achievement was at or above the 40th NCE benefitted the most, with an average impact of .52 SD. Similarly, lowess curves revealed that the greatest impact of the CC High intervention on second grade math achievement was for those boys above the 35th NCE in terms of Fall of first grade math scores (ES = .76 SDs). In third grade, the effect size over the band of maximum impact was .35, with those boys above the 35th NCE in the fall of first grade benefitting the most. As expected, we did not find main or interaction effects for the CC Low implementation condition in terms of boys' math or reading achievement scores at any point in time.

In terms of girls' achievement, the CC High X baseline interaction proved significant for math achievement in both first and second grades, whereas we found a main effect in third grade. In first grade, lowess curves suggested that those CC High girls whose Fall of first grade baseline scores were at or above the 40th NCE received the greatest intervention benefit relative to control girls--with an average effect size across the band of impact of .66 SD. In second grade, CC High girls who scored around the 60th NCE on math achievement in the Fall of first grade benefitted the most (ES = .57 SD) relative to controls. In third grade, the main effect for math achievement proved significant. The size of the main effect was .33 SD, with most of the benefit relative to controls seen in CC High girls with baseline math achievement scores between the 45-60 NCEs. As expected, no significant effects were found for the CC Low versus control girls comparisons at any point in time.

3.5.4 The Impact of the Family-School Partnership Intervention on the Proximal Target of Poor Achievement. In terms of FSP boys' total first grade reading and math achievement, we found an intervention main effect for the FSP High versus Control contrast (ES = .50 SD). No other significant effects were found.

3.5.5 The Impact of the CC Intervention on Teacher-Rated Total Problem Behaviors. *In terms of boys' total problem behaviors (concentration problems and aggressive and shy behavior) as rated by teachers,* the mixed model analyses yielded significant CC main effects in the Spring of first, second, and third grades. In addition, the CC X Baseline interaction proved significant in the Spring of second and third grades. Overall, CC boys were rated as having significantly fewer problem behaviors than control boys, with the greatest benefit accruing to those boys with moderate elevations in total problems at baseline. The CC effect sizes for boys were .49, .54 and .41 SD in first through third grade, respectively. ***Similar to the CC boys, we found significant main effects for the CC girls in the***

Spring of first, second and third grades, whereas the CC X Baseline interaction approached significance in the Spring of second and third grades ($p < .07$). Teachers rated CC girls as having fewer total problem behaviors than control girls, with the greatest intervention impact confined to those CC girls with moderate elevations in total problem behaviors in the Fall of first grade. The effect sizes were .30, .73, and .25 SD in first through third grades, respectively.

3.5.6 The Impact of the FSP Intervention on Teacher-Rated Total Problem Behaviors. *With respect to boys' teacher-rated problem behaviors*, we found a significant main effect in the Spring of second grade (ES = .25 SD), along with an FSP X Baseline interaction that approached significance. As with the CC intervention, teachers rated FSP boys as demonstrating fewer problem behaviors than control boys in the Spring of second grade. Moreover, intervention impact, as seen in the lowest curves, was largely confined to FSP boys with mild to moderate elevations in the level of baseline total problem behaviors. Neither the main or interaction effects proved significant in third grade. *For FSP girls*, the FSP main effect did prove significant in the Spring of second (ES = .34 SD) and third grades (ES = .35 SD), with CC girls rated as having fewer total problem behaviors than control girls.

3.5.7 Impact of the CC & FSP Interventions on the Proximal Target of Peer Nominations of Aggressive Behavior & Social Participation/Shy Behavior. In terms of CC boys' aggressive behavior as nominated by peers, the CC main effect was significant. CC boys had fewer peer nominations for aggression in the spring of first grade than boys in the control condition (ES = .27 SD). In terms of FSP boys' aggressive behavior as nominated by peers, we found a significant FSP X Baseline interaction. The lowest curves indicated the FSP intervention had its greatest impact for those boys with mild to moderate elevations in baseline levels of aggression, with an effect size across the band of maximum intervention impact of .26). No other significant effects were found.

3.5.8 The Impact of the CC and FSP Interventions on School Disciplinary Actions. Controlling for the effect of school and pre-test level of total problem behaviors, CC boys were 2.83 (95% C.I. 1.17 - 6.82) times less likely than control boys to have been suspended or removed from school for disciplinary reasons by the end of third grade. No significant effects were found for the comparisons involving CC girls or FSP boys and girls versus controls.

3.5.9 Impact of Improved Achievement on Psychological Well-Being. We examined the link between the change in total achievement from grade 1 to 3 (adjusting for Fall of first grade levels of achievement) and psychological well-being (total anxious and depressive symptoms) in third grade (adjusting for the pre-test, or fall of first grade, level of psychological well-being). Consistent with the 1985-86 JHU PIRC trials (Kellam et al., 1994a), improved academic achievement was significantly and inversely related to total anxious and depressive symptoms. The greater the improvement in achievement the fewer the symptoms in grade 3. The relationship was a curvilinear one. That is, beneficial impact in terms of psychological well-being was greatest amongst those children with a 1 SD or greater improvement in total achievement over grades 1-3, respectively. This effect profile held for boys and girls.

3.5.10 Impact of the CC and FSP Interventions on Utilization of Child Mental Health and Special Education Services. After controlling for the effect of (a) school, (b) third grade teachers' perceptions of the child's need for educational and mental health services, and (c) for pretest, or baseline, levels of poor achievement and concentration problems and shy and aggressive behavior, boys in the CC intervention by the end of third grade were (1) 5.62 times less likely than control boys to have been placed in self-contained special education classrooms for emotional/behavior problems, (2) 4.26 times less likely to have received counseling for emotional and/or behavior problems, (3) 2.55 times less likely to have received an evaluation for special education; and (4) 3.85 times less likely to have received school-based services for learning and/or behavior problems. CC boys were also 5.84 times less likely to be judged in need of medication for emotional or behavior problems by their third grade teacher. Each of the above odds ratios were significant at $p < .05$. The beneficial impact of the CC intervention on boy's service use relative to controls held up when the dependent variable used was an aggregate of each of the above indicators (any service use, yes or no). CC boys were 2.44 (95% C.I. 1.12 - 5.31) times less likely than control boys to have received any services by the end of third grade. Moreover, once the improvements in the proximal targets of the interventions were controlled for--using change scores aggregated across each of the proximal targets and adjusted for the pre-test levels of the proximal targets--the magnitude of the CC intervention effect on boys' third grade service use (i.e., any service use, yes or no) is significantly reduced (X^2 Change = 3.85, 1 df, $p < .05$) and the CC

effect is no longer significant, whereas the relationship between the change in the proximal targets and service use remains significant. This result suggests the CC intervention's impact on boys' service use is associated with improvement in the proximal targets of the interventions. CC girls, by the end of third grade, were 2.27 (95% C.I. 1.05 - 5.42) times less likely to have received school-based services for learning and/or behavior problems.

3.5.11 SYNOPSIS OF THE IMPACT ANALYSES AND JUSTIFICATION FOR FURTHER FOLLOW-UP.

Consistent with our previous work (Dolan et al., 1993; Kellam et al., 1994a,b), the results of the present study suggest that the early risk behaviors of poor achievement and the constellation of concentration problems and aggressive and shy behaviors are indeed malleable in first grade, particularly in boys. As expected, the combination of the behavioral and curricular components in the CC intervention resulted in significant impact in both achievement and classroom behavior. Moreover, the CC intervention's impact on achievement was about a 1/4 standard deviation larger than in our previous trial (Dolan et al., 1993), suggesting that the combination of the behavioral and curricular components may result in synergistic effects, at least in terms of achievement. Importantly, by the end of third grade, the CC intervention also resulted in a significant reduction in the likelihood of boys (1) being placed in a self-contained classroom for emotional/behavior problems, (2) having received school-based mental health services for behavioral and/or emotional problems, (3) being evaluated for special education services, (4) having received school-based services for learning or attention problems, (5) being judged in need of medication for behavior and/or emotional problems; and (6) having been removed from school for disciplinary reasons. Clearly, the breadth and magnitude of the FSP intervention effects on achievement and aggressive and shy behavior were more modest than for the CC intervention. Nevertheless, the FSP intervention may prove effective in reducing unmet need for child mental health services in the middle school years, when unmet need may increase along with the prevalence of substance abuse, conduct, and mood disorders. Moreover, the parenting and parent-school communication skills and principles presented in the FSP intervention may prove effective in the middle school years, when parent-child conflict increases as children seek greater autonomy from parents, and parent-school communication tends to fall off drastically (Epstein, 1983). The relatively high rate of parent participation in the FSP intervention (Ialongo et al., in press, Appendix B) increases our confidence in each of these hypothesized scenarios. Ultimately, the most effective use of our universal family-school partnership intervention may be in combination with our universal classroom-centered intervention.

Given first grade teachers and parents were not blind to intervention status, direct and independent observations of child behavior in the classroom and the home would have strengthened our evaluation of the impact of the interventions on concentration problems, and aggressive and shy behavior. However, the fact that we continued to see beneficial impact on teacher-rated total problem behaviors for the CC intervention through third grade increases our confidence in our findings, particularly given the fact that the participating children who started in nine schools and 27 classrooms were dispersed across 63 schools and 151 classrooms at the time of the Spring of second grade teacher rating. That number increased to 71 schools and 174 classrooms by the end of third grade both in and outside of the Baltimore City school system. Also assuring us that the interventions gains are real are the improvements seen in standardized achievement test scores, particularly as a function of level of implementation, and the reduced use of special education services by the CC boys in third and fourth grades.

With respect to justification for the proposed study, follow-up of the population through the transition to middle school will allow us to determine (1) whether the improvement seen in these early antecedent risk behaviors as the result of the interventions (particularly the CC intervention) reduces the risk for later social adaptational failure, early and sustained substance use, anxious and depressive symptoms and disorders, and (2) the corresponding need for, use, and subsequent costs of child mental health and special education services. (3) Follow-up through middle school will also allow us to assess the effectiveness of the interventions--particularly the FSP intervention--in reducing unmet need for child mental health and special education services; (4) We will also be in a position to assess the degree of unmet need for child mental health services in an economically disadvantaged population of urban school-children; (5) In addition, we can study the moderators of intervention outcomes and developmental course. This knowledge should serve to inform the field as to (a) for whom these universal interventions work, (b) to what degree, (c) for how long, (d) in what contexts, (e) what else is needed in terms of preventive interventions and mental health services, and (f) when in the elementary to middle school years should these additional interventions be implemented. (6) Continued study of the population through early adolescence will enable us to assess the growth

of substance use, antisocial behavior, and anxious and depressive symptoms and disorders during a period in the life course when they begin to increase. (7) We will also be in a position to study the antecedents and the moderators of their growth over time. (8) *The trial's design features major elements of an effectiveness study.* Indeed, the school was the setting for the intervention and the interveners were the existing teachers and school mental health professionals at the participating schools and not professionals brought in by the investigators. Since such studies are relatively rare, we can inform the field with regard to the degree and duration of intervention impact and implementation that can be expected--along with the sources of variation in impact and implementation--when moving from efficacy to effectiveness trials in economically-disadvantaged, urban elementary school settings.

4. RESEARCH DESIGN

Overview of the Research Design. In the next stage of our work, we will achieve our proposed aims by combining the continued analyses of our existing data from kindergarten through 4th grade with additional data obtained through interviews of the youths, their teachers, caregivers, and school mental health professionals in grades 5-8. The repeated, annual assessments will allow us to examine through early adolescence normal and pathogenic developmental paths and their variation and malleability in response to the preventive interventions.

4.1 AIMS 1-3: OVERARCHING HYPOTHESES TO BE TESTED

Overview. Given space limitations, we provide only the overarching hypotheses to be tested. Refer back to Sections 2.2-2.11 for more elaboration on the study hypotheses and mechanisms for intervention impact.

4.2 Overarching Hypotheses

1. In contrast to controls, children in the CC & FSP interventions will have significantly fewer substance abuse, conduct, and anxious and depressive symptoms and disorders. In turn, they will have a significantly lower need for, and utilization of, child mental health and special education services.
2. In contrast to controls and the CC intervention, children in the FSP intervention, owing to the focus on a strong family-teacher-school mental health professional partnership, will have a significantly lower rate of unmet need for child mental health and special education services.
3. Intervention impact will vary as a function of the pretest level of the early antecedent risk behaviors. The greatest response will be amongst those children who show mild to moderate levels of the risk behaviors at baseline in the Fall of first grade (Section 2.6).
4. Intervention impact will also vary a function of the initial and evolving characteristics of the child, and the family, peer group, school, and neighborhood social fields. The more adverse and enduring these characteristics are, the greater the attenuation of intervention impact in terms of later substance abuse, antisocial behavior and affective disorders, and the corresponding need for and utilization of child mental health services (Sections 2.2-2.11).
5. ***The Impact on the Distal Targets of the Interventions and the Corresponding Need for and Utilization of Child Mental Health Services Will Vary as a Function of the Magnitude and Duration of Intervention Impact on the Early Antecedent Risk Behaviors of Aggressive and Shy Behaviors and Poor Achievement.*** This is in keeping with a major tenet of the life course social fields perspective and the organizational approach to development we elaborated upon earlier: Success at an earlier stage of development may serve to facilitate the negotiation of social task demands at a later stage of development. Thus, the more effective the interventions are in reducing poor achievement and aggressive and shy behavior, the more likely the children will be to meet the social tasks demands of the classroom, peer group, and family social fields in first grade. This in turn should set the stage for continued success in meeting the task demands associated with the middle school years.
6. ***We Hypothesize that Intervention Response will Vary as a Function of the Number of Social Task***

Demands a Child Fails. For instance, if a child responds positively to the intervention in terms of academic achievement, but performs poorly in the peer group, family and romantic relations social fields, the beneficial effects of improved achievement on psychological well-being may be diminished. In simple social learning terms, the reinforcement the child receives for her successes in the classroom may be negated by the lack of reinforcement and/or punishment the child receives for failing in the peer group, family, and romantic relations social fields. ***Alternatively, success in one social field will protect against failure in another.*** As an example, mastery in the classroom social field may protect the child's psychological well-being, if s/he fails in the peer and/or romantic relations social fields. Reinforcement for success in the classroom social field from parents, teachers, and peers may serve to buffer the child against the effects of failure in the peer group or romantic relations domains. ***Importantly,*** however, the protective effects associated with the latter scenario are likely to vary as a function of the number of social fields a child may be failing in, the degree of those failures, and their nature. Protective effects from success in one social field are likely to be diminished in the presence of multiple failures of a serious nature in other social fields.

5. METHODS

5.1 Procedures

As indicated above (Section 4), we will achieve our aims by combining the continued analyses of our existing data set through grade 4 (ages 6-9) with additional data obtained through interviews in grades 5 through 8 with the youth, the youth's teacher, caregiver(s), peers, and school mental health professionals (psychologists and social workers). Data will also be obtained through school and court records, community mental health systems, and from the Census. In the spring of 5th-8th grades, a team of project interviewers will conduct a standardized interview with each youth, and their primary caregiver, teachers, peers, and school mental health professional. The youth, teacher, and school mental health professional interviews will be conducted in a private location within the youth's school, as was done in our previous follow-up of our 1985-86 JHU PIRC cohorts. ***Although where a child has dropped out of school, that is, simply fails to attend, we will interview the child at the location of his/her choice,*** as was also done in the 1985-86 JHU PIRC cohorts. Caregiver interviews will be conducted by telephone as was done with our 1985-86 cohorts. We will carry out face to face youth interviews with all consenting youths and their teachers/school mental health professionals within a 90-mile radius of Baltimore. For those youths and teachers outside this radius, phone interviews will be conducted. Section 5.3.2 and 5.3.3 describe sampling and tracing procedures. To insure the equivalence of the telephone and face to face interviews in terms of reliability and validity, we will pilot both the telephone and face to face interviews with a random sample of respondents in counter balanced order over a two-week period. These assessments will be incorporated into our standard pilot efforts to assess the acceptability, cultural sensitivity, reliability, and validity of our methods and measures. In the unlikely event the telephone interview proves unreliable, we will allot resources to carry out face to face interviews with a random stratified sub-sample of youths and teachers. Stratification would be based on the baseline aggression and poor achievement characteristics of the youths. Given evidence that survey non-respondents have higher rates of psychiatric disorders than respondents, a supplemental non-response survey will be carried out in parallel with the main survey.

5.2 MEASURES

5.2.1 The Existing Data Set: Periodic Assessments of SAS and PWB from the Spring of Kindergarten through Grades 1-4 & the Characteristics of the Youth & the Social Fields of Classroom, Peer Group, Family & Neighborhood

Table 1 depicts the core child and environmental constructs assessed ***at the population level*** from the spring of kindergarten through fourth grade by method and frequency, the instruments employed, and their psychometric properties. The constructs assessed are consistent with the intervention impact models described in Sections 2.2, 2.3, and 2.4. They include: (1) the proximal targets of the interventions (SAS: academic achievement, concentration problems, aggressive and shy behavior) and PWB (anxious and depressive symptoms); (2) the hypothesized mediators and moderators of outcome and intervention impact in terms of the characteristics of the youth (e.g.,

coercive behavior and rejection by parents, teacher, and peers) and the social fields of the classroom (e.g., teacher efforts aimed at increasing parent-teacher collaboration and communication, overall levels of achievement and aggressive and shy behavior and concentration problems), peer group (e.g., percentage of deviant peers), family (e.g., parent discipline, monitoring, reinforcement and teaching practices, support for and involvement in the child's achievement, parent-teacher communication and collaboration around child learning and behavior), and the neighborhood/community (e.g., neighborhood violence, substance use, unemployment and poverty); (3) Mental health and special education service use and perceived need for services.

School records (including standardized achievement scores, grades, and disciplinary actions) and teacher and parent reports were used to measure SAS, PWB, service use, perceived need for services, and hypothesized moderators and mediators of outcome. *Parent reports were also used to obtain data on the targeted family processes and practices in our intervention models.* Finally, peer nominations and child self-report measures were also used to measure SAS, PWB, and moderators and mediators of outcome. *In terms of when the measures were administered,* the teacher ratings were carried out in kindergarten through third grade, whereas the child self-reports of anxious and depressive symptoms are available from first through third grade. Caregiver reports and peer nominations were only collected in the fall and spring of first grade due to funding cuts. School records (grades, disciplinary actions, attendance, special education and mental health services, etc.) are available from kindergarten through fourth grade. Achievement scores are available from grades K-3, since the State of Maryland did not require testing in 4th grade. However, beginning with the 1997 school year, the Baltimore City School system and the surrounding counties have returned to yearly standardized achievement testing. Neighborhood and community characteristics are available from the Baltimore City Planning Office from grades K-4.

As indicated above (Section 3.5.1 Intervention Fidelity), we also have data on parent and teacher implementation/participation in the CC and FSP interventions. The CC implementation measures included direct observations of the use of the teaching and classroom behavior management practices called for in the CC intervention protocol. The FSP implementation/participation measures included workshop attendance, level of participation in the workshops, and compliance with "homework assignments", including the weekly Read Aloud and Fun Math Activities.

Appendix A also contains a listing of measures and constructs assessed in the random stratified sub-sample of children drawn from the larger population in the Fall of first grade. This case base sample provided us a first grade baseline assessment of the microsocial family processes (parent behavior management, teaching, and reinforcement practices) implicated in our developmental models of substance use, antisocial behavior and anxious and depressive symptoms, along with children's perceived competence, explanatory style, and salience of success in the behavioral, peer, family, and physical domains to perceptions of the self. The assessment methods employed included structured clinical interviews (carried out by child-clinical psychologists) and direct observations of parent-child interaction around a learning and behavior management task. As indicated above, a separate application will be submitted to NIMH to continue studying this case base sample within the context of the follow-up of the larger population.

5.2.2 OVERVIEW OF PROPOSED ASSESSMENTS IN THE SPRING OF 5TH-8TH GRADES

The youth interviews will be completed within 75-85 minutes in asymptomatic youth, a duration found acceptable in our previous follow-up efforts with the 1985-86 JHU PIRC cohorts. The peer nomination procedures will take approximately 45 minutes to complete, whereas the teacher interview will vary from 20 to 90 minutes depending on the number of target youths rated. The caregiver interviewer will run about 75-85 minutes in asymptomatic youth, which also proved acceptable in the 1985-86 and 1993 JHU PIRC cohorts. Information about school suspensions and expulsions and court adjudications will be obtained from archival school and juvenile court records. Characteristics of the neighborhood and community will be obtained by way of census and police records. Each of these means of data collection will be carried out concurrently each Spring in grades 5-8. Virtually all of the measures described below were used in the follow-up of the 1985-86 JHU PIRC cohorts in the late elementary and middle school years and all proved highly reliable and to have criterion validity. **Tables 2 and 3 list the proposed outcome measures and the measures of mediators/moderators of outcome, respectively.**

With respect to the justification for the annual assessments in grades 5-8, Muthen & Carran (1997) have demonstrated that statistical power *generally* increases as function of the number of time points available when modeling growth. In the proposed study, the power to detect intervention or mediator/moderator effects decreases dramatically with less than 8 data points--thus the need for annual assessments from 5th-8th grades. The annual assessments also allow us to fulfill our third aim: examining the timing, circumstances of onset, and course with respect to psychiatric symptoms and disorders.

5.2.3 Intervention & Developmental Outcomes: Social Adaptational Status, Substance Use, and Psychological-Well Being in the Social Fields of Family, School, and Peer Group--Youth Self-Report

The youth interviews in 5th-8th grades provide comprehensive coverage of the SAS, PWB, and substance use outcomes. *Social Adaptational Status: Diagnostic Interview Schedule for Children-Youth Report* (DISC 2.3-C, Fisher et al., 1992). The DISC 2.3-C's *disruptive behavior (ODD & CD) and substance abuse disorder* modules will be employed to assess socially maladaptive behavior and disorders, whereas, the DISC 2.3-C's *Anxiety and Dysthymia/Major Depression* modules will be employed to assess anxious and depressive symptoms and disorders. The DISC 2.3-C is a fully structured interview that generates DSM-III-R diagnoses as well as the number of diagnostic criteria met and *symptom counts* for discrete diagnostic entities. The interview specifies the exact wording and sequence of questions and provides a complete set of categories for classifying respondents' replies. It is also designed to be administered by lay interviewers. **The DISC 4 is currently being field-tested, if it proves reliable, we will use it in place of the DISC 2.3.**

With respect to concerns about the test-retest reliability of the DISC with repeated administrations, we assessed the two-week test-retest reliability of the DISC Dysthymia/MDD and Conduct Disorder modules in 1985-86 JHU PIRC cohorts during the middle school years. *The intraclass correlations for the total symptoms endorsed were .81 and .86, respectively.* The ICCs for the DISC were consistent with our symptom level measures of conduct problems, substance use, and anxiety and depression used in our 1985-86 JHU PIRC trials. Importantly, we are aware of Jensen's et al. (1995) findings, which suggest only fair short-term, test-retest reliability for the DISC 2.1 in a community sample, whereas it was good to excellent in a clinic sample. However, Schwab-Stone et al. (1996), utilizing a two-stage design, found fair to good test-retest reliability between a lay interviewer and clinician using the DISC 2.3 over a similar interval with a community sample. Importantly, in both studies, parent reports proved highly reliable. Moreover, Jensen (1997, personal communication) states, "My paper should not be construed as an argument against using the DISC, just a caution. The effects of attenuation are likely to be seen only in shortly spaced interviews in a TRT paradigm. Other uses of the DISC (e.g., Pat Cohen) have suggested that there is less attenuation after 6 months than after 2 weeks." Given that we are administering *a subset* of the DISC modules *once a year*, and these modules average about 6-8 minutes in asymptomatic children, we do not believe fatigue should undermine reliability or validity. Thus, we feel confident the DISC will provide us with data at least as reliable as existing symptom/behavior level measures of antisocial behavior, substance use, anxiety, and depression for the age range studied (see Jensen et al., 1996 for a comparison of the criterion validity of the DISC and Child Behavior Checklist).

5.2.4 Intervention Outcomes: Social Adaptational Status and Psychological Well-Being in the Peer Social Field-- Peer as Rater

While the teacher is being interviewed about the SAS of the target youth in grades 5-8, a team of interviewers will administer our peer nomination instrument to the target child and her/his classmates. As in first grade, the peer nomination instrument will be administered as a group activity and will include the same 14 items used in first grade. However, as described below, items designed to tap performance in the close friendship social field will be added. The existing items tap the constructs of likeability/rejection, social contact/shy behavior, authority acceptance/aggression, bullying, victimization, and anxious and depressive symptoms. In middle school, we will administer the peer nomination measure to the youth's language arts and mathematics classmates, thus paralleling the strategy used with the teacher interviews in middle school. The reason for this is that the youth's peer group may vary across academic subjects and classrooms. The peer nomination data will be aggregated across the mathematics and language arts classrooms for each youth. A passive consent procedure was successfully used in our late

elementary school peer assessments of the 1985-86 JHU PIRC cohorts to obtain the participation of the target youth's classmates. We intend to use that same procedure in the proposed follow-up.

In terms of justification for the annual peer assessments, they will provide us with an important source of information with regard to aggressive behavior that teachers and parents may not be privy to, as Coie et al. (1990) assert. In addition, the annual peer assessments provide us with indices of classroom/school environment and exposure to deviant peers. Given the potential role of deviant peers and the classroom context in the development of antisocial behavior and as a source of variation in intervention response, this a critical contextual variable to assess. In addition, the peer group is likely to undergo dramatic change with the transition to middle school. The peer nomination instrument to be employed is described immediately below:

Peer Assessment Inventory (PAI). The PAI is a modified version of the Revised-Pupil Evaluation Inventory (R-PEI) (Pekarik et al., 1976) and is designed to assess the child's adaptation to the demands of the classroom peer group. Ten items were selected from the original R-PEI on the basis of their relevance to three SAS constructs: aggressive behavior, social participation/shy behavior, and likeability/rejection. Additional items were included to assess depression and anxiety and bullying and victimization. To assess success in the close friendship social field in grades 5-8, we will add a subset of items from Windle's (1994) *Close Friendship Characteristics Scale*, which taps four friendship dimensions--two of which are positive--Reciprocity of Relations and Self-Disclosure--and two of which are negative--Overt and Covert Hostility. In terms of administration, a question is read aloud to the class and the children are then instructed to circle the names of all children in their classroom described by the question. Thus, children are able to make unlimited nominations of classmates for each question. Raw scores on each of the above dimensions are converted to standard scores based on the distribution of nominations within a child's classroom. The PAI has demonstrated high test-retest reliability and the coefficient alphas were all above .70 for subscales enumerated above (e.g., aggressive behavior, rejection, etc).

5.2.5 Intervention & Developmental Outcomes: Social Adaptational Status and Psychological Well-Being in the Social Field of Family--Caregiver Report

In this section, we describe the intervention outcome measures of SAS and PWB contained in our caregiver telephone interview. Note that with a few exceptions, including the DISC 2.3-P (described below), each of these scales were administered as part of our first grade caregiver telephone interviews. These measures will largely parallel the teacher and youth interviews in assessing SAS and PWB in the family social field.

Social Adaptational Status and Psychological Well-Being: Diagnostic Interview Schedule for Children-Parent Report (DISC 2.3-C, Fisher et al., 1992). The DISC 2.3-P's *Anxiety, Dysthymia/Major Depressive, ADHD, ODD, CD, and Substance Abuse Disorder* modules will be employed to assess maladaptive behavior and disorders. The DISC-4 will be utilized when it becomes available and is shown to be psychometrically sound.

5.2.6 Intervention & Developmental Outcomes: Social Adaptational Status in the Classroom--Teacher as Rater

The youth's teacher will be interviewed in the Spring of grades 5 through 8 to determine the youth's success in meeting the social task demands of the classroom. In middle school, the youths will have at least three teachers at a minimum. Although, it would be prohibitively expensive to interview all the youth's teachers, it seems feasible to interview at least two of the youth's teachers. Given the targets of the first grade interventions were reading/language arts and mathematics, we will interview the language arts and the mathematics teachers. In terms of statistical analysis of the teacher data, LISREL as well as LISCOMP allow us to treat the teachers as alternate indicators of a latent construct. Means and standard deviations can also be generated for the latent construct. The measures are described below:

Teacher Observation of Classroom Adaptation-Revised (TOCA-R; Werthamer-Larsson et al., 1991). The TOCA-R is a brief measure of each child's adequacy of performance on the core tasks in the classroom as defined by the teacher. It is a structured interview administered by a trained member of the assessment staff. The interviewer

records the teacher's ratings of the adequacy of each child's performance on six basic tasks: accepting authority (aggressive behavior); social participation (shy or withdrawn behavior); self-regulation (impulsivity), motor control (hyperactivity), concentration (inattention) and peer likeability (rejection). The teacher also responds to a set of items tapping her acceptance/rejection of the child (e.g., "how much do you enjoy having this child in your class?"). Finally, the teacher provides an estimate of the percentage of children in the classroom with mild, moderate, and severe problems with aggression and shy behavior, concentration, and academic achievement. Test-retest correlations over a four month interval with different interviewers were .60 or higher for each of these subscales, whereas the coefficient alphas ranged from .80 to .94. The TOCA-R was successfully used in grades 1-8 in our initial JHU PIRC trials and from grades 1-3 in the present evaluation.

Diagnostic Interview for Children 2.3-Teacher Report (DISC 2.3-T, Fisher et al., 1992). The *Disruptive Behavior Disorder* modules (ADHD, ODD, & CD) of the DISC 2.3-T will be administered along with the TOCA-R to provide us with a measure of SAS at the symptom/behavior and disorder level. As with the DISC 2.3-P, the DISC 2.3-T is a fully structured interview that specifies the exact wording and sequence of questions and provides a complete set of categories for classifying respondents' replies. It is also designed to be administered by lay interviewers. The DISC-2.3-T generates DSM-III-R diagnoses as well as the number of diagnostic criteria met and symptom counts. The DISC 4-T will be employed when it is available.

5.2.7 Measures of Intervention & Developmental Outcomes: School, Police and Court Records

Besides the youth, teacher, peer and caregiver interviews, school records including attendance, grades, standardized test scores, disciplinary removals and suspensions (and the associated offenses), special education and school mental health services received, free lunch status, and demographic information will continue to be obtained by hand or magnetic data file transfer, both with error and reliability checks. The report card data include grades for academic subjects, as well as ratings of work study habits and independence. Police and court records will also be obtained to determine the frequency and nature of police contacts and criminal convictions.

5.2.8 MEASURES OF MENTAL HEALTH SERVICE UTILIZATION

Service Assessment for Children and Adolescents (SACA): Parent Report. The SACA is a structured interview, designed to accompany the DISC 4.0 and obtain information on child mental health service utilization. It represents an effort to improve and expand upon the Service Utilization and Risk Factor interview, which was developed and field-tested as part of the NIMH collaborative MECA study (Goodman et al., 1996). The results of the recent UNOCCAP field trials suggest the SACA has excellent reliability and validity. We will use the SACA to obtain: (1) past and present use of mental health and educational services, including the setting (e.g., outpatient, inpatient, school-based, primary care, juvenile justice system) and reasons for the services; (2) the nature, frequency, and duration of the services; (3) satisfaction with services received; (4) the nature/type of mental health insurance (if any) and its cost (if any); (5) the costs of the services received, including indirect costs (e.g., loss of time from work) and out of pocket expenses for incidental costs (e.g., travel to the clinic); (6) the amount of time associated with travel to and from the sessions and the time for the session itself; (7) satisfaction with the services provided; (8) parent's perceptions of the child's need for mental health services, (9) perceptions of the availability, affordability, accessibility, effectiveness, and cultural relevance of child mental health services, (10) attitudes towards seeking mental health services, and (11) reasons for not seeking or accessing services in the presence of perceived need, including the race of the mental health professionals.

Service Assessment for Children and Adolescents (SACA) Interview: Teacher Report. We will create a variant of the SACA-P's school-based mental health and educational services module to be used in concert with the DISC-T to obtain the teacher's report on the special education and mental health services she perceives each child needs, is currently receiving, or has received in the past year, the nature of the services received, the providers, the frequency, duration and setting for the services (e.g., in-class, resource room, self-contained classroom, etc.) and the problem(s) that prompted the use of the services. In terms of perceived need, we will obtain from teachers the type of problems the services are needed for, their estimate of the kinds, frequency, and duration of services needed, and the professionals who should provide the services.

Service Assessment for Children and Adolescents: School Mental Health Professional Report. Using a variant of the school-based mental health and educational services module of the SACA-P, like the teacher, the school psychologist and/or social worker will be asked to report on any mental health services they provided to the target child, and the nature, frequency, dates, and costs of the services. The school mental health professional will also be asked to report on the types of mental health services offered in the target child's school, the providers (i.e., psychologists, social workers, psychiatrists, paraprofessionals, etc.), costs of services to the child and his/her family (e.g., third party billing) and the number of hours per week mental health professionals are available to students and their families. As with the teacher, the school mental health professional will be asked to report on the perceived need for services in terms of the type of problems the services are needed for, their estimate of the kinds, frequency, and duration of services needed, and the professionals who should provide the services.

School and Local and State Mental Health Services Records. Record searches will be used to augment parent, teacher, and school mental health professional report of child mental health service use and the costs of such services. Serving to facilitate our efforts in obtaining data on mental health use and costs is the fact that the state of Maryland has recently set up a central agency for paying out all public mental health benefits. In addition, the Baltimore City School system now has a computerized database of special education and school-based mental health services, which includes the nature, frequency, and duration of services, and the nature of the providers (e.g., school psychologist, social worker, speech pathologist, etc.). Also serving to facilitate the gathering of cost information for school-based services is the fact that Baltimore City and County schools have gone to a site-based management and budgeting system, wherein special education and school mental health services are purchased from the central school district office. Costs of such services can then be estimated based on what a principal "pays" for a special education teacher, speech pathologist, or school psychologist/social worker, etc. Baltimore City and County schools have computerized data bases which contain information of special education and school-based mental health services received. State of Maryland Medicaid records can also be searched "online" for mental health services claims and their costs. For privately insured families, we will seek consent from the parents to obtain claims data from their respective insurers and the costs of the services provided.

5.2.9 VARIATION IN INTERVENTION RESPONSE & DEVELOPMENTAL OUTCOMES: MODERATORS AND MEDIATORS OF OUTCOMES--YOUTH SELF-REPORT

The youth interview also provides coverage of the hypothesized mediators and moderators of PWB and SAS intervention outcomes, *which were elaborated upon in sections 2.2-2.11*. With respect to antisocial behavior, substance use, and academic failure, the relevant mediating and moderating constructs to be assessed in the youth interview include: 1) parental monitoring, 2) discipline, 3) reinforcement, 4) rejection, 5) problem solving, 6) involvement and support for the youth's academic progress, and 7) exposure to deviant peers and siblings. The majority of these measures were used from third grade through high school in our 1985-86 cohorts and were found to have excellent psychometric characteristics. The mediators and moderators to be assessed most relevant to the risk of depression include: 1) perceptions of control, and 2) perceived competence in the achievement, behavior, physical attractiveness, intimate relationships, and close peer relationships domains.

Mediators/Moderators of Outcomes: Structured Interview of Parent Management Skills and Practices--Youth Version (SIPMSP, Patterson, 1982). This interview was developed by Patterson and his colleagues as a counterpart to their parent interview. The youth version assesses the parenting constructs integral to the Patterson et al. (1992) model of the development of antisocial behavior and social survival skills, which were the caregiver disciplinary practices targeted in the family-school partnership program in first grade. The relevant parenting constructs assessed are: parental monitoring, discipline, reinforcement, rejection, problem solving, and involvement in learning and behavior. The youth is asked to respond to questions regarding their caregiver's(s') disciplinary and teaching practices in forced choice response formats. The youth responds to Likert scales, with the values attached to the scale categories varying with the content of questions. Chilcoat et al. (1995) found that youth reports of parent monitoring on this scale predicted early initiation of drug use.

Mediators/Moderators of Outcomes: Exposure to Deviant Peers & Siblings (Capaldi & Patterson, 1989). As elaborated earlier, Patterson et al. (1992) and colleagues have theorized that drift into a deviant peer group increases

the risk for antisocial behavior. They argue that antisocial behavior and substance use is not only modeled but reinforced by the deviant peers. We successfully used Capaldi and Patterson's (1989) self-report scale in the 1985-86 JHU PIRC cohorts to assess this construct along with additional items assessing the impact of deviant siblings. Youths are asked in forced choice format to indicate how often their peers and/or siblings have engaged in antisocial behavior and/or substance use. Coefficient alphas ranged from .78 to .81 in the 1985-86 JHU PIRC cohorts during the middle school years.

Mediators/Moderators of Outcomes: Self-Perception Profiles for Adolescents (SPPA, Harter, 1985). Perceived competence is viewed in our developmental epidemiological model of depression as a mediator of the relationship between SAS and PWB. The SPPA will be used to assess perceived competence in grades 5-8. The domains to be assessed include Scholastic Competence, Social Acceptance, Athletic Competence, Physical Appearance, Behavioral Conduct, Romantic Appeal, and Close Friendship. The SPPA's validity is supported by findings linking scores to perceived control, mastery motivation, academic achievement, and depression (Connell, 1985; Harter, 1985). We successfully used the Harter scales in our follow up of the 1985-86 JHU PIRC cohorts.

Mediators/Moderators of Outcomes: Multidimensional Measure of Children's Perceptions of Control (MMCPC, Connell, 1985). The MMCPC assesses control related beliefs in four domains of functioning. These are the Cognitive, Social, Physical (athletic) and Global domains. Perceived lack of control over important outcomes is central to our model of depression. The MMCPC items involve either internal causal attributions, powerful other or external attributions, or unknown causes (e.g., "When I get a good grade at school, I usually don't understand why I did so well."). Half of the items involve successes and half involve failures. Youths' ratings of how true each item is of them are summed to form 6 perceived control scores within each domain: internal success and failure, powerful other success and failure, and unknown success and failure. The MMCPC's validity is supported by findings linking scores to other control related constructs including perceived competence, mastery motivation, academic achievement (Connell, 1985) and depression (Weisz et al., 1987). We will augment the MMCPC with items from The Multidimensional Measure of Adolescent's Perceptions of Control (MMAPC, Wellborn & Connell, 1987). The MMAPC is an upward extension of the Multidimensional Measure of Children's Perception of Control (Connell, 1985). We will add perceived control and expectations from the MMAPC's close friend and romantic relations domains. Internal consistency for each of the subscales is in the .90s (Wellborn & Connell, 1987). The reliability and validity of the scale has been established with urban, African-American middle and high school populations.

Mediators/Moderators of Outcomes: How Important Are Each of These Things to You? (Harter, 1988). The purpose of this instrument is to determine the saliency of a particular domain to the youth's self-worth (see Section 2.7). Harter developed this instrument to complement the Self-Perception Profile for Adolescents. For each item the youth is presented with a description of two groups of youths, one of which is described as perceiving a particular domain to be important to their self-worth (e.g., Scholastic Competence), whereas the other group does not. After the youth selects the group most like her/him, s/he is asked to refine their choice further by deciding whether it is "sort of true for me" or "really true for me."

Mediators/Moderators of Outcomes: The Life Events Questionnaire Adolescent Versions (LEQ-C & LEQ-A; adapted from Coddington, 1972). The LEQ-A is a checklist of potentially stressful life events that children and adolescents may experience. We have modified the LEQ-A to include a broader range of events relevant to adolescence and family-related stressors, adding items from the Adolescent Perceived Events Scale (APES) (Compas et al., 1985) and the Adolescent-Family Inventory of Life Events and Changes (A-FILE) (McCubbin et al., 1982). We have also modified the LEQ-A to allow for a test of the "cost of caring" hypothesis, regarding gender differences in the prevalence of depression (Kessler et al., 1984). That is, we will ask the youth to report on three sets of events in accord with Gove et al. (1993): (1) the events they experienced directly, (2) events experienced by family members, & (3) events experienced by friends. Consistent with our developmental epidemiologic model of depression, the data on life events will also allow us to test the hypothesis that such events may interfere with the youth's ability to meet social task demands, which, in turn, may increase the likelihood of decrements in psychological well-being.

Mediators/Moderators of Outcomes: The Arizona Social Support Interview Schedule (Barrera, 1981). Social

support from parents and peers will be assessed with the ASSIS, a structured interview that is designed to assess the availability of and satisfaction with social support network resources. In our developmental epidemiologic model of depression, social support may serve to buffer the youth from decrements in PWB in the face of failures in the main social fields. Respondents are asked to name people who are perceived to be providers of six categories of support including intimate interaction, material aid, advice and information, positive feedback, physical assistance, and social participation. The ASSIS also contains questions concerning subjects' satisfaction with network members during the past month.

Mediators/Moderators of Outcomes: Pubertal Status/Timing and Height and Weight Trajectories. The onset of puberty appears to be associated with a sharp rise in adolescence in the incidence and prevalence of affective disorders and antisocial behavior (Brooks-Gunn & Petersen, 1991; Petersen et al., 1991). It also appears associated with the emergence of gender differences in depressive symptoms and disorders (Petersen et al., 1991). Any effort aimed at understanding the mechanisms underlying these phenomena will require precise knowledge of pubertal timing (Petersen et al., 1991). Costello and colleagues (Costello et al., in press a, b) in their Great Smokey Mountain Study were able to successfully assess pubertal status by asking children to indicate which of a series of drawings representing the Tanner stages of development (Dorn et al., 1990; Tanner, 1962) were most like them. Petersen and her colleagues (Petersen et al., 1991) have suggested that pubertal timing can also be assessed by determining the age at which peak height velocity is reached. Consequently, in grades 5-8 we will obtain data on pubertal status using the methods developed by Costello and Petersen and their respective colleagues. In terms of assessing height and weight, we will use the methods developed for the National Center for Health Statistics studies of adult and child health status.

5.2.10 VARIATION IN INTERVENTION RESPONSE & DEVELOPMENTAL OUTCOMES: MODERATORS/MEDIATORS OF OUTCOMES--CAREGIVER REPORT

As with the youth interview, hypothesized mediators and moderators of response to the interventions and developmental outcomes will also be assessed, including the processes that were targeted in the family-school partnership intervention: parental monitoring, discipline, reinforcement, rejection, problem solving, and involvement in learning and behavior. Additional mediators and moderators to be assessed include parental and family physical and mental health, substance use, history of substance abuse and dependence, stressful life events, and social support. The measures are described immediately below:

Structured Interview of Parent Management Skills and Practices--Parent Version (SIPMSP, Patterson, 1982). The SIPMSP was designed to assess the major constructs included in Patterson et al.'s (1992) model of the development of antisocial behavior in children. That is, the family processes targeted for change in the parent discipline component of the family-school partnership intervention (FSP). As in the youth version, the items assess (1) parental monitoring, (2) discipline, (3) reinforcement, (4) rejection, and (5) problem solving. Parents are asked to respond to questions regarding their disciplinary practices in open ended and forced choice response formats. In collaboration with the Oregon Social Learning Center Prevention Center, we modified the SIPMSP to include items assessing parent-teacher communication and involvement and support for the child's academic achievement, which were targets of the FSP family learning component. In our first grade analyses (1993-94 JHU PIRC trials), we found inept discipline as assessed by SIPMSP was associated with increased child aggression as rated by teachers, whereas parent rejection was related to decrements in child psychological

well-being in terms of anxious and depressive symptoms. We also found significant relations between the SIPMSP support for achievement subscale scores and children's standardized achievement in first grade.

Family Psychiatric History Screen for Epidemiologic Studies (FPHSES). The FPHSES was successfully used in NIMH's Methodology for the Epidemiology of Child & Adolescent Disorders (MECA) study, as part of the Service Utilization and Risk Factor Interview (Goodman et al., 1991). It offers a brief screen of family psychiatric history, including substance abuse and dependence, for the biological parents and grandparents of the study youth and the adult members of the household. Data on the family's psychiatric status will allow us to model the impact of family psychopathology and substance abuse and dependence on the youth's SAS, PWB and substance use.

Social Functioning and Resources and Life Change Events from the Health and Daily Living Form (HDL). The social functioning and resources and life change events indices from the Health and Daily Living Form (HDL) (Moos, Cronkite, Billings, & Finney, 1987) will be used as to assess parent social support and life stresses. The HDL indices assess membership of the social network and what the members provide in terms of material, informational, and emotional support. In addition, the HDL indices assess satisfaction with one's social support as well as the quality (harmonious versus conflicted) of the relationship with various members of the social network. The life change indices tap a variety of negative and positive life events.

Household Structure and Demographics. A number of family sociodemographic characteristics will also be obtained including: parental education, occupational status, income (including all sources), ethnicity, size of family household, and ages and relationships of household members.

5.2.11 Variation in Intervention Response & Developmental Outcomes: Moderators/Mediators of Outcomes-- Characteristics of the Neighborhood and Community Social Fields

Census Bureau data and police and school records will continue to be used to derive salient ecological variables. The working assumption behind this domain of variables is that there can exist broad ecological variables (e.g., deviant peers) that vary for the youths participating in the preventive trials which may modify their developmental course and the effect of the interventions on SAS, PWB, and substance use outcomes of interest.

5.3 THE POPULATION

5.3.1 Defining the Original Study Population

In the Fall of 1993, 678 urban first-graders were recruited from 27 classrooms in 9 elementary schools primarily located in western Baltimore. Of these 678 children, 53.2% were male, 86.8% were African-American, and 13.2% were white. At entrance into first grade, the children ranged in age from 5.3 to 7.7 years with a mean age of 6.2 years ($SD \pm 0.34$). Just under 2/3 (63.4%) of the children were on free or reduced lunch. Of the 678 children available for participation in Fall of first grade, written parental consent was obtained for 97% of the children. Three percent of the children's parents or guardians refused to allow their children to participate or refused to respond to the consent request despite repeated attempts at obtaining consent. There were no significant differences in terms of sociodemographic characteristics or intervention condition between consenting and non-consenting children. Ninety-three percent of the children remained enrolled in project schools through grade 1 and completed the one year of intervention in their assigned intervention or control condition. Departure from Baltimore City Public Schools (BCPS) or transfer from an intervention to non-intervention school was unrelated to intervention condition from 1st through 4th grade.

5.3.2 Percentage of Children Assessed Over the Course of the Study

At the end of first grade, data on the principal targets of the intervention (e.g., standardized achievement, grades, disciplinary actions, attendance, special education status, and teacher rated concentration problems, and aggressive and shy behaviors) were available for 96.6% of the study population, whereas similar data are available for 84.6 % of the population through the spring of third grade. School record data from Baltimore City and County schools is available for 89.8% of the population through 4th grade.

5.3.3 Tracking and Retaining the Population into Middle School

In the 1996-97 school year, 81.39% of the original cohort of 678 children remained in the BCPS. The remaining 18.61% had left the system. Of those who left, we have a current address for all but 4.6% of the families. Nearly all of the children and families who left the system moved to the immediately surrounding counties, where we have continued to remain in contact with them through quarterly newsletters, and birthday and holiday cards. Based on the initial JHU PIRC trials, we expect that the rate of children moving out of the BCPS will slow to about 3-4% a year, so that by eighth grade approximately 65-70% will remain in the system. Importantly, with the help of the JHU

PIRC, we regularly trace the current addresses and phone numbers of the prevention program participants and obtain their current grade in school, achievement scores, special education status and disciplinary actions through the computerized tracking systems maintained by the BCPS and the school systems in the surrounding counties. In those instances when a child cannot be traced through the local school system tracking files, we contact the individuals the families identified as most likely to know their current whereabouts. In the event that fails we have a number alternative strategies we can use to assist us in tracing children and families. These include contacting the post office for a forwarding address, followed by the computer searching of telephone books through Compuserve's PhoneFile. Subsequent strategies include searching the TransUnion, and Equifax data bases: voter registration files; motor vehicle registrations; the national death index; juvenile court records; Housing Authority records; Department of Social Services records; and community organization membership networks (e.g., churches). We estimate that we will be able to trace a minimum of 95% of the families who will have left the system in the 1997-98 school year and that most families will be within a 50-mile radius.

5.3.4 Combining Discrepant Diagnostic Information and the Determination of Caseness

Piacentini et al. (1992) and Bird et al. (1992) recently concluded that complex algorithms for combining discrepant diagnostic information offer no clear cut advantage over a simple combinational rule that identifies symptomatic criteria as positive when they are acknowledged as positive by either parent or child informants. Bird et al. acknowledges, however, that the use of this simple combinational rule is likely to lead to inflated estimates of rates of disorders. To guard against this, Bird et al. (1990) recommend determining "caseness" by combining diagnostic criteria and a measure of impairment, such as the Children's Global Assessment Scale (C-GAS, Shaffer et al., 1983). Shaffer et al. (1983) as well as Bird et al. (1987) report excellent reliability for the C-GAS. Consequently, in the proposed study, the simple algorithm suggested by Piacentini et al. (1992) and Bird et al. (1992) will be used in the event of discrepant reports. In addition, a clinical psychologist and a child psychiatrist will independently complete a C-GAS for all youths based on the DISC 2.3 data from parents, teachers, and the youths, themselves. In completing the C-GAS, the clinicians will also review the data on child adaptive functioning as reported by parents, teachers, and the youths, themselves, and as reflected in grades, standardized achievement scores, special education status, and school and juvenile justice records of disciplinary actions and arrests and convictions, respectively. With respect to those children who meet full DISC criteria for a disorder, if both clinicians assign the child a score of 60 or lower (indicating significant impairment), the child will be identified as being a definite case. If the two clinicians disagree, a third clinical psychologist or child psychiatrist will be asked to complete the C-GAS. The determination of caseness will be then based on the scores of the majority. Following Bird et al.'s lead, those children who meet full DISC criteria for a disorder, but whose C-GAS scores fall between 61-71, will be identified as "probable cases". This more liberal criterion (i.e., C-GAS < 71) will also be employed for determining caseness for sub-syndromal children (those falling just short of full DISC criteria for a disorder). This sub-syndromal group of children are important to include in our analyses, given our hypothesis that universal preventive interventions may also reduce the number of children in need of selective and indicated preventive interventions (i.e., those targeted at children who are sub-syndromal and are at risk for a disorder). *With respect to caseness in terms of learning disorders/problems*, along with standardized achievement scores, grades, and Individual Evaluation Plans abstracted from school records, we will utilize teacher and school mental health professionals reports with respect to perceived need for services, the type of problems the services are needed for, the kinds, frequency, and duration of services need, and the professionals who should provide the services.

5.3.5 Estimated Rates of Psychiatric Disorders, Service Need, Unmet Need and Utilization

An important question for the proposed study is whether there will be a sufficient number of cases of psychiatric disorder, service use and unmet need in the study population. Given there are relatively few methodologically sound studies of the prevalence of DSM-III-R disorders in epidemiologically defined populations of inner-city, African-American youths in the age range to be studied, it is difficult to estimate the number of true cases of disorder that will be identified in the proposed research. However, Bird (1996)'s recent review summarizing the research on the epidemiology of childhood disorders since 1980 provides us some insight into the rates of disorder we might encounter in 9 through 13 year olds and the risk factors for these disorders. From these investigations, we can expect that between 17 to 51.3 % of the children assessed will meet criteria for any psychiatric disorder. Once impairment,

severity, or pervasiveness is taken into account, the range drops to between 10 to 22.4 %. With regard to specific diagnoses relevant to the proposed study, Velez, Johnson, and Cohen (1989) in the New York Longitudinal study report prevalences of 16.6, 11.9, and 15.6 % for Attention Deficit, Conduct, and Oppositional Disorders, respectively, in the 9-12 year old age range. The prevalence rates for Overanxious, Separation Anxiety and Major Depressive Disorder were 19.1, 25.6, and 2.5 %, respectively. The New York Longitudinal Study along with virtually all the studies reviewed by Bird provide point prevalences versus life time estimates of disorders. Lewinsohn and colleagues (Lewinsohn et al., 1993) provide point as well as lifetime prevalences for older adolescents (9th through 12th graders). Of interest are the lifetime prevalences for Major Depression and Dysthymia which are 24.8 and 4.04%, respectively, for girls and 11.60 and 2.32 %, respectively, for boys. Given we will be administering the DISC 2.3 in 5th-8th grades, the rates of MDD and Dysthymia might more closely approximate Lewinsohn et al. (1993)'s lifetime rates than the point prevalence estimates in the studies reviewed by Bird (1996). Of further relevance are the lifetime rates of substance abuse disorder reported by Lewinsohn et al. (1993), which were 8.42 for boys and 8.19 for girls. Based on data from the 1985-86 JHU PIRC cohorts, the lifetime prevalence of any mental disorder (i.e., conduct, ADHD, affective and/or substance abuse disorder) with associated impairment was 22.2%. Thus, the number of cases with accompanying impairment (approximately 140) should be sufficient. The number of cases is likely to increase to nearly 35% when we include probable cases (C-GAS 61-71) and sub-syndromal cases--that is, cases likely in need of preventive services in the form of indicated interventions. In terms, our 1985-86 JHU PIRC data revealed that about 24.4% of our cases with a diagnosed disorder with impairment received services in the mental health speciality sector for that disorder. This number increased to just over 30% when services provided by school counselors (psychologists and/or social workers) was taken into account.

Of note, the fact that we are studying a relatively homogenous population with respect to geographic location, SES, and race provides us with a distinct advantage in terms of estimating need and unmet need in similar populations. However, homogenous populations such as ours are less suited to understanding the role of geographic location, SES, race, culture, and ethnicity in help-seeking and service utilization patterns. Consequently, we have not emphasized examination of such variation in our proposal. Nor do we emphasize the impact of service use on intervention outcomes, given the likely variation in the nature, duration, intensity and appropriateness of services received, and the fact that children are not randomly assigned to services.

5.3.6 Estimated Rates of the Need for Special Education Services, Unmet Need and Utilization

Based on the 1985-86 JHU PIRC data collected in the middle school years on need, unmet need, and use of special education resources, and utilizing the indices mentioned above with respect to defining the need for special education services, we expect that approximately 35% (or about 235) of the children will be determined to be in need of some level of special education services, varying from consultative services (Level 1) to residential placement (Level 5). Based on the 1985-86 JHU PIRC data, we expect that only 40% (or about 94) of the children who are in need of special education services will be receiving them. Thus, approximately 140 children will have unmet need. Consequently, we should be in an excellent position to examine the impact of the FSP intervention--relative to controls and the CC intervention--on reducing the degree of unmet need for special education resources.

5.3.7 The Question of Whether the Level of Care is Appropriate

Bickman (1997) as well as others (Dorwart et al., 1991; Jacobs, 1990; Stroul & Friedman, 1986) have pointed out that the simple receipt of services is no assurance that the level of care is appropriate. For example, inpatient treatment may be more appropriate for an actively suicidal adolescent than outpatient psychotherapy. Unfortunately, as part of the their Fort Brag Evaluation Project, Bickman et al. (1997) found little agreement amongst clinicians as to the appropriate level of service a child should be receiving, despite training the clinicians in a standardized set of criteria developed by the managed care providers. Consequently, although the question of whether the level of care is appropriate is an important one, it's unlikely we will be able to fully address it in this proposal. Nevertheless, if service researchers develop an adequate algorithm/procedure for reliably determining appropriate level of care, we will seek further funding to employ that algorithm/procedure in ascertaining whether the level of care received was appropriate. Importantly, we will collect comprehensive data on the level of care to insure such analyses will be possible.

6. DATA ANALYSIS

6.1 Development of the Measurement Model, Data Reduction Strategies & Protection Against Type 1 Error

Consistent with Anderson and Gerbing (1988), we will employ a two-step approach to the development and testing of our causal models. The first step is the development of the measurement model, which begins with the a priori groupings of variables based on theoretical considerations. Our *life course/social field* framework along with the work of Patterson et al. and other relevant theories will be used to guide those groupings. For example, consistent with *life course/social field* theory, manifest variables are grouped into SAS and PWB within social fields, by social task and by natural raters. In line with Patterson et al. (1992), family characteristics and/or events (e.g., family structure, income, parent education and physical and mental health) that are hypothesized to impact negatively on parenting practices will be grouped a priori under the label of family stressors/disruptors. Following the a priori grouping of variables, the next step in the development of the measurement model includes the reduction of these manifest variables through confirmatory factor analytic procedures, using LISCOMP (Analysis of Linear Structural Relations with a Comprehensive Measurement Model, Muthen, 1984; Muthen, 1987). A major advantage of LISCOMP is that it allows for estimation of the measurement model (as well as the structural equation model) when the metric is at the interval, ordinal, or categorical level and the data are either normally or non-normally distributed. Once the measurement model adequately fits the data, multiple-group analyses can be used next to determine the consistency of the model across males and females and over time. We will adhere to Farrell's (1994) framework for evaluating a hierarchy of hypotheses to explore differences between groups, and over time, in terms of the measurement model. ***Reduction of the data through factor analysis, along with Bonferroni corrections and the bootstrapping techniques should serve to protect against Type 1 errors.*** Moreover, as described below, one of the primary analytic tools we plan to use is latent growth curve modeling. Thus, using a package such as LISREL or LISCOMP, we can simultaneously estimate the fit of a complete model, as opposed to a piecewise approach that runs the risk of inflated Type 1 error rates and chance findings. Of course, in the case where the overall chi-square measure of fit is small relative to the degrees of freedom, the model is likely over fitted and parameters with very large standard errors can be eliminated, along with those where the effect size is trivial. There are also a number of more formal measures of model fit, which take parsimony (in terms of the number of parameters) into account along with model fit (Joreskog & Sorbom, 1993). Each of these methods allow us to avoid the problem of the chi-square decreasing when parameters are added to the model, despite no concomitant improvement in conceptual fit. These measures include the AIC (Akaike, 1987), CAIC (Bozdogan, 1987), and the single sample cross-validation index ECVI (Browne & Cudeck, 1989).

6.2 TREATMENT OF MISSING DATA

Section 5.3.3 summarized our previous success in following up and interviewing the sample during the first three years of the study. We estimate that we will be able to locate, recruit, and interview at least 90% of the 678 youths making up the cohort and their teachers and parents. By itself, a 10% loss to follow-up is considered a borderline situation given inferences could be affected by this amount of missing data. This would be particularly true if there was systematic loss to follow-up (Brown, 1993). We have, in fact, found consistent evidence of a small, but measurable relationship between missingness due to mobility and absence and on the one hand and to prior ratings of aggressive behavior and achievement on the other. Such differential missingness is common in longitudinal studies (Brown, 1992). We anticipate that those who exhibit conduct problems and poor achievement during late elementary and early middle school years will be somewhat harder to locate than those who are not, and, therefore, we will need to allow for differential attrition in some of our analyses. Specifically, we plan to use the following procedures, starting from the simplest to the more complex. The first approach, which relies on a technical assumption of "missing at random" (Rubin, 1976), will simply use early aggressive behavior and achievement as covariates in our analyses. If these characteristics "determine" later missingness, then any analyses which condition on these variables are fully appropriate (Rubin, 1987; Little and Rubin, 1987). For some analyses we perform, however, we would not want to present all of our analyses conditional on early aggressive behavior and achievement scores, so we will compute unconditional versions of these models where aggressive behavior and achievement scores are not included in the model. Techniques such as the EM algorithm (Dempster, Laird, & Rubin, 1977) can be used to obtain maximum likelihood estimates of the variance covariance matrix which can serve as input into programs such as LISCOMP. Also, many of the hierarchical linear model procedures that we plan to employ will

use the equivalent of the EM algorithm to correct for missing data in, for example, models of growth and development. A second set of procedures that we will use is based on missing data methods specifically developed at University of South Florida for handling nonrandom (nonignorable) missing data (Brown, 1990; Brown & Zhu, 1994). These methods, called protective estimators, allow for adjustments in the usual techniques for missing data to permit the possibility of nonrandom missingness which is likely to be present in such data. We will also use two other methods for dealing with missing data. One involves the application of multiple imputation techniques as outlined in Rubin (1987), which we have successfully applied in repeated measures analyses. The second involves special techniques for handling missing data that are available within LISCOMP. These will be used to handle limitations in our longitudinal data set arising from cost considerations; that is, when, in the past, we were unable to collect all the measures we wanted to each year. Specifically, the data we have on parenting practices is based on parent reports in the Fall and Spring of grade 1. Clearly, these two time points for parent ratings are extremely timely, but it would have been helpful to have other time points as well. Since it would be theoretically possible to have latent variables for parenting practices from grades 2 through 4 which involve indicators of parent ratings, we will consider the data we do have on parent ratings as incomplete; it is observed at two points in time for the entire cohort, but is completely missing at other times. We can, however, apply LISCOMP models longitudinally to these data in such a way that parent ratings are treated as "missing at random" in the longitudinal models at grades other than 1. If we find that the unique variance of the two first grade measures of parenting practices along with the proposed measures of parenting practices in grades 5 through 8 remain constant across time, and the factor loadings are also constant, then we would assume that had the parenting practices measures been administered in 2nd-4th grade, the measurement error structure and factor loadings would have been invariant over time. Under such an assumption, we can perform longitudinal analyses which permit corrections for the complete missing parent ratings while still obtaining consistent estimates of the structural parameters. Such techniques generate two major effects on the inferences. First, the variances of our parameter estimates increases when data such as parent ratings are completely missing. Secondly, the robustness of our statistical models decrease when some data are completely missing, as indicated in Brown (1990). Thus, our analyses may be more sensitive to incorrect specification of model assumptions. In such cases we will examine whether we have evidence that the model assumptions hold.

6.3 Aims 1-3: Data Analytic Strategies for Examining the Impact of the Interventions, the Malleability of the Early Risk Behaviors, & Mediators/Moderators of Outcomes

As indicated above, Aims 1-3 are integrally related to one another, such that an analysis of intervention impact and developmental outcomes and the factors influencing them represents a test of the life course/social fields framework and the links between early and later social adaptational status and psychological well-being. Consequently, rather than present a separate analytic plan for each of these aims, we present an overall approach to Aims 1-3. Recall that Aims 1-3 require us to study (1) the extent to which the early risk behaviors of poor achievement and aggressive and shy behavior are malleable in response to the interventions and the degree to which improvement in these early risk behaviors is associated with reduction in the distal targets of the interventions, and the corresponding need for, use, and associated costs of mental health and special educational services; (2) the extent to which the interventions--particularly the FSP intervention--reduce the unmet need for mental health and special education resources; (3) the effects of the initial and evolving characteristics of the child and the social fields of the family, peer group, classroom, school, and neighborhood on intervention impact; and (4) the antecedents and moderators of the onset and course of antisocial behavior, substance use and anxious and depressive symptoms and disorders, and the degree of unmet need for child mental health and special education services. The primary analytic tools to be used in achieving these aims will be random coefficient growth modeling and its reformulation as a latent growth model (LGM), and the mixed survival and growth models encompassed in Hedeker et al.'s (1996) MIXGSUR. As described by Muthen & Curran (1997, Appendix D), LGM provides a means of modeling a developmental function as a factor of repeated observations over time. Since LGM is carried out using SEM methodology, it shares many of its strengths, including the ability to test the adequacy of the hypothesized growth form, to correct the variables of interest for measurement error, and to incorporate time invariant and time varying covariates as mediators and/or moderators of growth (Muthen & Curran, 1997). Moreover, as illustrated in Muthen & Curran (1997), the LGM approach takes advantage of the multiple-group feature available in packages such as LISCOMP to simultaneously test for intervention-control differences in growth. One of the short-comings of the LGM approach is that like with

any SEM model, estimating latent variable interactions has proven to be a daunting task. However, Arminger, Muthen, Wittenberg, & Khoo (submitted) describe a new alternative, which does not require the addition of new product variables or the implementation of non-linear parameter constraints. It is also suitable for small sample sizes since it is a full-information approach. As described by Arminger et al. (submitted), a Bayesian analysis approach is employed to obtain the posterior distributions of the parameters. The computations are made possible using the Gibbs sampler in conjunction with Metropolis-Hastings algorithm. Returning to the specifics of the LGM approach, the model depicted in Figure 1 (next page) is adapted from Muthen & Curran (1997) and illustrates the use of LGM in analyzing intervention impact on teacher-rated aggression in our initial JHU PIRC preventive trial. In line with the model depicted in Figure 1, we can estimate the influence of the level of growth during the intervention period on the rate of growth in a subsequent period of time or stage in the life course. This allows us to test the hypothesis that the degree of intervention impact on the distal targets of the CC and FSP interventions will vary as a function of the magnitude and duration of impact on their proximal targets of poor achievement and shy and aggressive behaviors in first grade. In addition, the modeling of the intercept (baseline or pretest level of the early antecedent risk behavior targeted by the intervention) and its relationship to the growth in the ys provides a means of testing for treatment X initial status (e.g., baseline effects) in our intervention impact analyses. Muthen & Curran (1997) provide a five-step approach to testing for intervention-control differences in such a model. Essentially, once we have fitted a growth model to the control and intervention groups separately, we can then simultaneously test for intervention versus control differences without interactions, using the multiple-group facility in LISCOMP. A two-group analysis with interactions is next, followed by a sensitivity analysis of the final model. For simplicity sake, residuals and correlations are not drawn in the Figure 1. However, residual correlations are included for the intercept as well as the slopes. For the growth process, correlations are allowed for among residuals at adjacent time points. Muthen & Curran's (1997) approach can accommodate non-linear growth as well.

As indicated above, we can also include time varying (e.g., child concentration problems, parent disciplinary practices and support for learning), as well as time invariant covariates, in the LGM approach to modeling intervention impact and variation in impact. For example, the extent to which the FSP intervention effects are mediated by parent discipline and learning practices can be tested (see Figure 2, next page). In fact, we can add parenting practices to the model as a growth process, wherein we can model the reciprocal relationships between parenting practices and social adaptational status over time. The impact of contextual variables on this process, such as, peer group, classroom, neighborhood, and school, within which children are nested, can also be modeled. Relatedly, Muthen (in press) illustrates a latent variable approach to modeling longitudinal and *multilevel data*. Muthen's (in press) approach relies on a disaggregated model for multilevel data, where the usual sample covariance matrix is analyzed with respect to *the within and between group variation*. This is in contrast to an aggregated model, where the total covariance matrix is used. Figure 3 (next page) is adapted from Muthen (in press) and illustrates a latent variable approach to modeling the link between social adaptational status and psychological well-being over time, taking into account the contribution of the school context to the model. Using the multiple-group approach described above, we can add intervention to the model and test whether the growth in achievement is greater in the intervention groups. Moreover, we can simultaneously test, whether, in accord with our life course/social fields framework, these greater gains in achievement translate into greater improvement in psychological well-being in the intervention versus control conditions. Alternatively, we can examine the impact of psychological well-being on response to the intervention. In addition, we can add perceived competence in the academic social field as a mediator of the relationship between academic achievement and psychological well-being. ***An additional advantage of the LGM approach is that we can examine the impact of one growth process on another.*** For example, we can model the impact of the interventions on psychological well-being as measured by the How I Feel (child self-report measure of anxious and depressive symptoms) in first through third grade on the DISC MDD/Dysthymia symptoms assessed in 5th-8th grades (See Figure 1).

With respect to categorical outcomes and the impact of the interventions on the need for and utilization of child mental health services, we can use a recent variant on Gibbons & Hedeker's (1994) random-effects probit model (MIXOR), which incorporates a mix of survival and multilevel analyses (Hedeker et al., 1996) (MIXGSUR). With MIXGSUR, we can model the impact of intervention status on survival rates with respect to the age at which a mental health disorder or sub-syndromal disorder requiring service use (See Section 5.3.4) is first diagnosed,

controlling for the initial level of the early risk behaviors of poor achievement and aggressive and shy behavior and concentration. We can also test the hypothesis that relative to controls and the CC intervention, the FSP intervention will result in a shorter latency or survival time to receiving needed services, taking into account the point in time need was first established. Of course, our ability to carry out this analysis will depend on having a sufficient number of children who actually receive services. Thus, to achieve sufficient power for such an analysis, we may need to combine receipt of mental health and special education services. An additional advantage of MIXGSUR is that it will also allow us to assess the impact of school (e.g., classroom levels of antisocial behavior and poor achievement) or neighborhood effects (e.g., the prevalence of drug use) on intervention outcomes. Additional covariates can be included in the model such as family stress and psychopathology and parenting practices.

Latent growth mixture models (LGMM) represents an additional approach to modeling intervention impact on service need and utilization (Muthen et al., 1996). LGMM allows one to model the impact of an earlier growth process on a later dichotomous outcome in the form of a DSM-IV diagnosis. The advantages of the LGM approach over the more traditional random coefficient model were elaborated above. The model employed by Muthen et al. (1996) is depicted in Figure 4 and includes intervention. Thus, we can use LGMM to measure the impact of the interventions on their distal outcomes (e.g., the need for services) in terms of the magnitude and duration of intervention response during and following their implementation. Moreover, we can test for variation in intervention response as a function of the baseline level of the early risk behaviors of poor achievement and aggressive and shy behavior. Essentially, with the LGM approach we can have growth processes representing the course of the early risk behaviors (achievement and aggressive and shy behavior) and psychological well-being over and beyond the intervention period influencing outcome in terms of the presence or absence of a mental disorder requiring services by the end of eighth grade. Time varying and invariant covariates can be added to the model along with cluster/contextual effects.

Cost-Effectiveness Analyses: Prevention researchers (e.g., Institute of Medicine, Mrazek & Haggerty, 1994; Pentz, 1993) have recently noted the importance of economic analysis in the evaluation of prevention programs, particularly in the current era of fiscal stringency (e.g., Gorsky & Teutsch, 1995). Recent guides to applying economic principles in program evaluation have set forth the basic concepts, in particular, the idea that prevention benefits on average could be estimated as the product of (1) the number of "bad" outcomes (e.g., illnesses, deaths, crimes, etc.) actually prevented by the program multiplied by (2) the average cost of a "bad" outcome. However, very little literature exists documenting the cost-benefit or cost-effectiveness of drug abuse and mental health prevention programs, given the difficulties associated with measuring and monetizing comparative prevention intervention outcomes and obtaining the data on costs of mental health and drug treatment services (Kim et al., 1995). In terms of school-age children and adolescents, the measurement and monetizing of special education and juvenile services has proven equally difficult. The JHU PIRC along with our partners with the NIMH Prevention Sciences Method Group (PSMG) are currently developing strategies to deal with these issues (measurement and monetizing outcomes) as well as the problems associated with missing data and variation in intervention impact (See Appendix E). We will rely heavily on their expertise and resources (faculty and staff) in planning and carrying out the cost-effectiveness analyses of the CC and FSP interventions described below. As pointed out earlier, serving to facilitate our efforts in obtaining data on mental health use and costs is the fact that the state of Maryland has recently set up a central agency for paying out all public mental health benefits. In addition, the Baltimore City School system now has a computerized database of special education and school-based mental health services, which includes the nature, frequency, and duration of services, and the nature of the providers (e.g., school psychologist, social worker, speech pathologist, etc.). Moreover, Baltimore City and County schools have gone to a site-based management and budgeting system, wherein special education and school mental health services are purchased from the central school district office. Costs of such services can then be estimated based on what a principal "pays" for a special education teacher, speech pathologist, or school psychologist/social worker, etc. Nonetheless, we recognize the plan described below is an ambitious one and will depend heavily on the progress made by the JHU PIRC and our PSMG collaborators in solving the problems associated with measuring and monetizing costs, dealing with missing data, and taking into account variation in intervention impact. Moreover, given the difficulties associated with measuring and monetizing the benefits of mental health and special education services, we propose only to do a cost-effective analysis as opposed to a cost/benefit analysis which would require

us to translate all benefits into monetary terms.

Cost-Analysis. The total cost of each of the interventions will be calculated based on the expenditures/outlays for each of the following: (1) intervention program/curricular materials and equipment (e.g., "Warm Line" phone, installation, and monthly toll charges); (2) trainer/consultant fees; (3) personnel costs, including stipends for teachers and school mental health professionals for after school training and supervision, substitute teacher wages and benefits for coverage of classrooms while participating teachers attended training/supervision meetings, and the wages and benefits of the parent support staff associated with the FSP intervention; (4) incentives, meals, travel and child care for parents participating in the FSP intervention; (5) utilities, maintenance, security and other operating costs; and (6) administrative costs. In calculating the total cost of the interventions, we will also take into account variable versus fixed costs; that is, we will adjust for variation over time in wages, benefits, supplies, and the depreciation of intervention materials and equipment. In addition, we will include indirect costs, such as the costs to parents who attend workshops in terms of the decreased opportunity for earnings from wages and/or other income producing activities. The total cost can be then translated into a per student, per family, and per school cost for each intervention. In the case of the FSP intervention, the total cost can also be adjusted to take into account family participation rates. Consistent with Pentz (1993), we will report the costs of the evaluation and intervention development costs separately and in total.

Benefit Analysis. As noted above, we propose to carry out a cost effectiveness versus a cost benefit analysis. Nevertheless, with the help of the JHU PIRC, and PSMG collaborators, and to the extent possible, we will seek to estimate both the direct and indirect benefits of the interventions in terms of saved costs at each annual assessment period from the spring of fifth grade through the spring of eighth grade. In addition, as described in Appendix E, we will project the potential lifetime benefits of the interventions based on the models currently being developed by Drs. Salkever and Spencer. We also attempt to take into account the interaction between child, family, school, and neighborhood characteristics in terms of variation in intervention impact and the corresponding costs of services. As to the direct benefits of the intervention, we will examine the saved costs associated with each of the interventions relative to controls with respect to the reduction in the number of cases with a psychiatric disorder (based on the DISC) requiring child mental health services (i.e., a score on the C-GAS < 60) or preventive services (sub-syndromal children with a C-GAS < 71), and the reduction in the number of cases requiring special education resources as determined by teacher and parent perceptions, standardized achievement testing, grades, Individualized Education Plans (IEP), and school disciplinary actions. Indirect benefits in terms of saved costs will include reductions in economic losses due to lost wages/and or family income due to the parent participation in the child's mental health and/or special education interventions. The costs of the mental health and special education services will be estimated using local (Maryland Mental Health System and Baltimore City and County schools) as well as national economic cost data. Similarly, we will use local and national economic cost data to estimate the costs associated with lost wages and family income. Costs will be adjusted on a yearly basis for inflation.

Following the guidelines developed by Yates (1980, 1985, 1996), relationships between cost and outcomes, and the differences between the CC and FSP interventions and controls in terms of saved costs, will be examined with ratios and graphs of cost versus effectiveness. These will be carried out at different levels of specificity, including per child, per family, per classroom, and for the entire program (see also Newman & Sorensen, 1985). These analyses will be conducted at each of the annual assessments over 5th-8th grades, as will analyses of cumulative net benefit and time to return on investment. Analyses of our intervention implementation and participation data should also allow us to determine the value of a particular intervention component relative to the likelihood of its implementation by teachers and/or parents. For example, we can examine the cost-effectiveness of the Warm-Line component of the FSP intervention in light of its use. Our implementation data, combined with our data on outcomes, can be used to identify the "active ingredients" or components of the interventions and separate cost analyses can be computed for these components. We can also examine the level of implementation at which cost-effectiveness is achieved. In this way, we may be able to more precisely apportion our resources for supervision and mentorship aimed at insuring intervention fidelity. The results of these analyses will be (a) description of how program resources were allocated among procedures, (b) description of the costs of achieving each outcome, (c) quantitative specifications of how much each procedure could be implemented to minimize the costs of achieving a set level of outcomes, and (d) of how to maximize outcomes (effectiveness, benefits) within specific resource

(budget) constraints.

6.4 STATISTICAL POWER

Table 1 (Appendix F) presents power estimates for sample sizes from 100 to 600 when the outcome of interest is categorical and the prevalence rates for the outcome of interest are 50%, 40%, 20%, 15%, 10%, & 5% respectively, and the exposure rates vary from 10-50%. Assuming an intervention + control sample size of 400 (e.g., CC + Controls), with equal cell sizes, we would have power of .80 at alpha .05 to detect a modest sized odds ratio of 2.1, when the prevalence rate of the outcome of interest is 20% (e.g., need for mental health services as defined by meeting DISC criteria for a disorder and C-GAS < 61) and the exposure rate is 50% (i.e., equal control and intervention cell sizes). Given that when we include probable and pre-syndromal cases the prevalence of cases in need of some level of mental health or preventive services increases to about 35%, we believe the 20% prevalence rate represents a very conservative estimate. If our analyses of impact suggest gender differences, we will have power of .80 to detect odds ratios as small as 2.8.

In the case of predictors of mental health need other than intervention status, once again we should have ample power to detect even relatively modest odds ratios. For example, utilizing data from the 1985-86 JHU PIRC cohorts, assume a 10% lifetime prevalence rate for a disruptive behavior disorder (ODD and/or CD) by age 14 or eight grade, a sample size of 500 (or about 70% of the study population), and that 25% of these youths have been exposed to the risk factor of interest (e.g., antisocial peers). In such a case, we will achieve 80% power at the .05 level of alpha for Odds Ratios as small as 2.4. Even with sample sizes of 400 (<60% of the sample) and 300 (< 50 %) we would be able to detect odds ratios of 2.7 and 3.0, respectively, with 80% power at the .05 level of alpha. As can be seen in Table 2 (Appendix F), even in the presence of a confounder, we can expect to detect modest to moderate odds ratios, assuming a prevalence rate of 10% for the outcome of interest and a 25% exposure rate. As alluded to above, when we combine probable and sub-syndromal disorders with definite disorders, we can expect even greater power to detect significant effects given we expect greater prevalences than for a definite disorder alone.

As to dimensional outcomes, assume we perform a linear, hierarchical regression analysis with three groups of independent variables ordered in a causal hierarchy with the three groups containing five, three, and two variables respectively, or a total of 10 variables. Also assume, the semi-partial R-Squares are estimated to be moderate to small in size, more specifically, .15, .06, and .04, respectively. With a sample size *as small* as 200, we should have power of .83 at the .05 level of alpha to detect the smallest of these effect sizes (.04) in terms of R-Square increment. We should also have power of .92 to detect an R-Square increment of .06, which we estimated for our second set of predictor variables (Cohen, 1988, Tables 9.3.1, 9.4.1, and 9.4.2).

With respect to power estimation for general growth modeling within our experimental design, Muthen and colleagues (Muthen & Curran, 1997, Appendix D) have developed a framework which we can rely on to assess power to detect significant intervention effects as well as moderators and mediators of impact and developmental outcomes in general. The approach Muthen and colleagues advocate relies on Satorra and Saris's work (Satorra & Saris, 1985; Saris & Satorra, 1993) on the power to detect mis-specified latent variable models. The approach Muthen and colleagues advocate accommodates balanced as well as unbalanced designs and can provide power estimates for a point in time or in terms of the increase in the growth factor mean due to the added growth factor in the intervention group. Power estimates can be obtained for both main and interaction effects. Muthen and Curran (1997) provide tables for estimating power for the general two-group growth model and use data from the JHU PIRC's 1985-86 intervention trials to illustrate the use of the tables. Based on those tables, we have generated a second set of tables that reflect the number of the time points we will have available in the proposed study, along with estimates of power when both mean and variance are considered. We use those tables to provide a simple illustration of the power to detect significant intervention effects in the proposed study as well as time invariant and time varying covariates. Assume a combined intervention and control sample size of 400 (CC + Controls) with equal cell sizes. Let's also assume the growth curve includes 8 points in time and that we are estimating the power to detect a modest, or small, effect size of a .25 SD (r-square = .016) difference in terms of the increase in the growth factor mean due to the growth factor in the intervention group. As seen in Figure 1 (Appendix F), the power to detect an effect size of .25 approaches 1.0, when mean and variance are taken into account, and is approximately

.90, when only the mean is considered. If intervention impact varies as a function of gender, we will still achieve power of nearly .90, assuming a combined intervention control sample size of 200, an alpha of .05, an effect size of .25, and mean and variance are taken into account. In the case of an intervention x the pre-test level of the targeted risk behavior interaction, the power to detect such an effect approaches .90, given a combined intervention + control sample of 400, an effect size as small as .30 SD, and ten assessment time points (e.g., 4 teacher ratings obtained in first grade, one each in second and third grade, and the four projected in grades 5-8). Once again in the case of gender differences in impact, assuming a combined intervention + control sample size of 200 and 10 assessment points we could detect an effect size of .40 with .83 power. An intervention x pre-test level interaction effect size of .40 is commensurate with what was found in the 1985-86 JHU PIRC cohorts in middle school with respect to aggression (Kellam et al., 1994b).

7. HUMAN SUBJECTS

IRB Review and Approval. The Johns Hopkins University School of Hygiene and Public Health Committee on Human Volunteers has given its approval to cover the measures, design and procedures described in the proposed study (CHR # H33.96.07.29.A).

(1) **Source of Study Population and Characteristics.** This award will build upon the Department of Mental Hygiene's Epidemiologic Prevention Center for Early Risk Behaviors research protocol (NIMH 5 P30 MH38725). Consequently, the subject population will be same. That is, the subjects will be 678 elementary school children (and their caregivers) who entered first grade in the nine Baltimore City schools which participated in the original field trials carried out by the Center. This research program is based in large part within the Baltimore City Public School System, and the approval of the Superintendent of the Baltimore City Public Schools has been granted for the work. The sample consists of 678 male and female children, who at the time of the proposed assessment will be approximately 11-14 years of age. The criteria for inclusion of children in first grade was first grade registration in each of the participating schools in the Fall of 1993. No new children will be recruited for this study.

Depending on our success in recruiting and retaining parents for participation in the assessments interventions, a sample of approximately 678 children and their caregivers is anticipated.

(2) **Source of Research Material.** Assessments and the procedures used to administer them will be those described in the Experimental Design and Method section of this document. They will include teacher and parent ratings of children's social adaptational status, classmate/peer nominations of children's classroom behavior and mood, student self-reports of anxiety and depression, independent observation by trained staff, self-reports of competence, and school records of attendance, grades, and scores on national achievement tests. Census data, information about family organization and health status, and aggregate data about neighborhoods including socioeconomic data and police statistics will also be collected.

The assessments administered to parents will include measures of parent mental and physical health, social support, life stresses, family demographics and self-reported and observed approaches to discipline and learning. All responses from participants will be confidential, and children and parents may at any time in the interview process decline to participate. No tissue or body fluids are needed.

(3) **Recruitment.** The process for recruitment involves engagement with both Baltimore City Public school personnel and parents prior to requesting informed consent. All children in the randomly selected control and intervention classrooms are eligible to participate by virtue of their first grade registration in schools in the three urban areas. We plan to hold meetings several times each year to explain the program to teachers and parents. Permission for participation will be obtained from all children and at least one parent (or guardian) in the form of written informed consent. A letter explaining all assessments and the interventions with a signature form requesting that the parent give consent, withhold it, or ask for more information will be distributed and collected by the classroom teacher. Follow-up calls will be made to all parents, including those who request more information and those who have not responded; visits to the home when needed to explain the project will be made by Prevention Center staff. Once children and parents have agreed to participate they will be invited to attend additional meetings and will be kept

informed of progress through newsletters and brochures.

A number of steps will be taken to maximize participation rates. In general, we anticipate that recruitment efforts are enhanced by the endorsement by community organizations and institutions that are accepted and valued by the community. The fact that the assessments proposed in this application have the endorsement of the Baltimore City Public Schools, and the teachers and principals at the participating schools should help maximize participation rates. In addition, as in the past, we will seek the endorsement of significant community organizations in the Baltimore area. Originals of the written consent from each parent will be stored in locked files in the Prevention Center.

(4) Potential Risks. For the most part, the data gathering requirements of the proposed research pose no more than minimal risk to the participants. Our confidence in terms of the measures to be used is based on our 11 years of experience in using most of these instruments and our continued policy of piloting all new measures and revisions. Moreover, teachers, parents and children have reported a high level of comfort with the assessments in the past. Indeed, we have had no reports from either principals, teachers, parents, or children of deleterious side effects. However, with respect to some data (e.g. psychological assessments), possible inadvertent disclosure of the data is a concern, as is possible stressful effects of the assessment procedures.

(5) Protection of Subjects. We treat all the study data as sensitive and confidential data, removing personal identifiers from computer and hard copy forms and maintaining a separate master list under high security. All participants, parents, teachers, and school personnel are informed that all data are confidential and that we cannot disclose the results of any individual child's assessments. To the extent that data are self-incriminating we will request a waiver from subpoena.

Another undesirable side effect may be that the assessments will serve to unduly raise parents' hopes of improved outcomes for their children. To combat these effects, assessors will provide a realistic appraisal of the extent of any benefits parents and children may gather from the assessments.

In addition, if a child is referred to the Prevention Center by a teacher, principal, or parent who has a concern about extreme behavior or mood, or if an assessor or intervener identifies a child who appears to be in severe distress during or soon after the time of assessment, the Center has a crisis backup procedure in place and a team consisting of two licensed clinical social workers and two B.A. level crisis referral intake workers to respond to the identified problems. The Center social workers will consult with school personnel and parents, may interview the child, and facilitate a link to services for the child. The Children's Mental Health Clinic in the Hopkins Department of Psychiatry has agreed to provide backup psychiatric services as needed along with the Baltimore City School System's Division of Pupil Services led by Louise Fink, M.A. and her staff of over 120 school psychologists and social workers.

(6) Potential Benefits. The assessments should enhance our understanding of the effectiveness of the interventions and the etiology of early affective and disruptive behavior disorders. Such information can be utilized in developing effective preventive and acute care interventions. These assessments may also facilitate the development of screening measures which could be administered to large populations of children in hopes of identifying children in need of mental health services. During the course of the study, we may also be able to identify children experiencing significant distress and make appropriate referrals for treatment. These immediate benefits may also be linked to later decreases in the risk of later drug use, conduct and psychiatric distress for children.

Parents and children in the proposed study will be given an honoraria (\$20 for parents and \$5 for children) for participating in each of assessment points (Spring of 5th, 6th, 7th and 8th grade).

8. VERTEBRATE ANIMALS

N/A

9. CONSULTANTS/COLLABORATORS

The proposed study involves two consultants. Dr. C. Hendricks Brown, a professor in the Department of Biostatistics at the University of South Florida, is the Principal Investigator on an NIMH grant to develop new biostatistical methods for the longitudinal evaluation of outcomes of preventive intervention trials and is a recipient of Research Scientist Award from NIMH. Led by Dr. Brown, a group of other experts in biostatistics in the Departments of Epidemiology and Biostatistics at the Johns Hopkins School of Hygiene and Public Health, Oregon Social Learning Center, University of California at Los Angeles, Arizona State, the Institute for Social Research and the University of South Florida, have been developing new methods to solve missing data problems in longitudinal studies of the effects of preventive interventions. Dr. Brown and his colleagues are also studying the application of random effect regression and latent growth curve modeling to such longitudinal evaluations. Dr. Brown's expertise in each of these areas will be utilized in the proposed research, particularly in modeling outcomes in the presence of non-random missing data and determining the most efficient methods for studying intervention effects over time and the factors associated with variation in outcomes over time.

Dr. Bengt Muthen is a professor of Education in the Department of Education, University of California at Los Angeles, and is the developer of LISCOMP, the counterpart to LISREL, for use with non-normal data and ordinal or nominal level data. Dr. Muthen and his colleague, Dr. Curran, (Muthen & Curran, 1997) describe the use of latent growth curve modeling and formulas to compute power for such analyses. In fact, the analyses and the power tables developed were based on data from the 1985-86 JHU Prevention Center intervention trials. Dr. Muthen will be consulted on the application of his LGC approach to examining intervention effects and the power to detect such effects as well as the impact of hypothesized mediators and moderators of outcomes in the proposed study.

10. CONSORTIUM/CONTRACTUAL ARRANGEMENTS

N/A

11. LITERATURE CITED

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