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The Pittsburgh Girls Studies: Overview and Initial Findings

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Abstract

The Pittsburgh Girls Study is a longitudinal, community-based study of 2,451 girls who were initially recruited when they were between the ages of 5 and 8 years. The primary aim of the study was testing developmental models of conduct disorder (CD), major depressive disorder (MDD), and their co-occurrence in girls. In the current paper, we summarize the published findings from the past 5 years of the PGS and place those results in the context of what is known to date about developmental psychopathology in girls. Key results suggest that DSM-IV mental disorders tend to have an insidious onset often beginning with sub-syndromal symptom manifestation and that there appear to be shared and unique developmental precursors to disorder in subgroups of girls based on race and poverty.

Introduction

Only recently has the impact of sex on physical and mental health become a focus of etiologic and phenotypic research. As recently as 2001, a report prepared by the Institute of Medicine was released entitled, *Exploring the Biological Contributions to Human Health: Does Sex Matter*, the response to which was affirmative (Wizemann, & Pardue, 2001). Although sex differences in the prevalence of some mental disorders have been challenged as reflecting bias in assessment (Hartung & Widiger, 1998), more recent conceptualizations of such differences is that they have the potential to inform causal hypotheses for etiology of mental disorders (Zahn-Waxler, Shirtcliff, & Marceau, 2008).

There are multiple approaches to studying the importance of sex in developmental psychopathology. Comparing males and females within a single study is the most direct approach to testing hypotheses about sex differences. Such approaches have been successfully used with clinic samples (e.g., Fossum et al., 2007), and studies in which the dependent measure is continuous and the incidence of specific disorder is not a focus (e.g., Storvall & Wichstrøm, 2003). These latter studies allow testing of interactive effects of sex on predictors and precursors of psychological functioning. Even the most common forms of childhood disorders, however, occur rarely in the population, and in the case of most disorders, the prevalence for one sex is lower than the other resulting in small numbers of cases for at least one sex. Large studies comparing representative samples of boys and girls often yield relatively few cases, which can be problematic in generating robust findings. For example, in the 1999 British Child Mental Health Survey of over 10,000 children (Maughan et al., 2004), only 42 girls met DSM-IV criteria for CD.

Another approach to research on the importance of sex on mental health is to formulate sex-specific hypotheses that are then tested within a single sex sample. This is the approach used to test developmental models of CD in girls in the Pittsburgh Girls Study (PGS), which is the focus of the current paper. The sex-specific model of CD is informed by the normative developmental differences between girls and boys, such as differences in the development of language skills and empathy (see Keenan & Shaw, 1997 for a review), and the developmental demands of preadolescence and adolescence and the types of skills girls need to meet such

demands (Keenan & Hipwell, 2005). Moreover, the sex-specific developmental model of CD includes tests of a possible sex specific phenotype of CD in terms of age of onset, symptom manifestation, and developmental sequences of symptoms of disorders (Keenan, Loeber & Green, 1999).

Thus, the broader conceptual framework for the PGS is one in which individual differences in social (e.g., sociability), emotional (e.g., regulation of negative emotion) and behavioral functioning (e.g., risk taking) interact with environmental factors that serve to increase or decrease the risk of precursor or sub-syndromal conditions that precede the expression of mental disorders (e.g., CD and MDD). Identifying these individual differences and the factors that influence the progression from precursors to full disorder is critical for prevention and intervention efforts. Moreover, determining the developmental trajectory of a disorder and points of deviation from that trajectory is a necessary first step toward testing causal hypotheses regarding the onset, exacerbation, and remission of mental disorders.

The goals of the current paper are to elucidate the aims, provide details of the sampling and design, and summarize the published findings from the past 5 years of the PGS. In addition, we discuss the results from the past five years in the context of what is and is not known about developmental psychopathology in girls.

The Aims and Design of the Pittsburgh Girls Study

Primary Aims of the Pittsburgh Girls Study (PGS)

The PGS is informed by a rich tradition in epidemiologic studies of psychopathology including the Dunedin Longitudinal Study (McGee et al., 1992), the Christchurch Health and Development Study (Fergusson & Horwood, 2001), and the Ontario Child Health Study (Fleming et al., 1993). The PGS also is a complement to recent longitudinal studies of youth in the United States such as the Pittsburgh Youth Study (Loeber et al., 2001), the Great Smoky Mountain Study (Costello et al., 2003) and the Oregon Adolescent Depression Project (Lewinsohn et al., 1993). The unique features and contribution of the PGS to the existing literature are: 1) a large sample size of 2,451 girls and their parents; 2) a sample drawn from the community such that prevalence data can be generated; 3) a focus on the development of CD in girls; and 4) yearly assessments that begin early in development (ages 5 to 8 years) and extend into late adolescence/early adulthood (ages 17 to 20 years).

The aims of the PGS main study are to describe the phenotype and developmental course of conduct problems in girls, the interface between CD and co-occurring disorders, from early childhood through late adolescence, and the risk and protective factors that impact the course of CD in girls. To better characterize conditions that commonly occur and/or have been understudied in girls, several sub-studies have been initiated (see Figure 1 for a summary) specifically to support more comprehensive data collection on girls' substance involvement, reproductive health, and preadolescent precursors to depression. The following sections review the sampling, methods, and initial findings from the PGS, and from these three sub-studies.

Sampling of the PGS

The PGS began in 1999. The first year of funding was used to prepare for and carry out a stratified, random household sampling, with over-sampling of households in low-income neighborhoods, to identify girls who were between the ages of 5 and 8 years. There were two reasons for over-sampling low-income neighborhoods. The first was that data from other epidemiologic studies indicated that the base rate of CD in girls was low (e.g., Costello et al., 2003). Thus, even in a large study of over 2,000 girls, a base rate of 1% might yield an incidence of only 20 girls in a given year. A known environmental risk factor for disruptive behavior problems in U.S. samples is living in a low-income environment (Dodge, Pettit & Bates,

1994). Thus, over-sampling girls living in such environments would likely increase the base rate. The second reason is that the mechanism by which poverty confers risk for CD is still unclear. By over-sampling low-income neighborhoods, we aimed to have sufficient power to parse the potential effects of income (e.g., parenting, neighborhood, exposure to stressors) on the development of CD in girls, with the ultimate goal of narrowing the pool of targets for prevention.

Pittsburgh is a largely blue-collar city, formerly dominated by the steel industry. According to the 2000 Census, which was conducted in the year following the start of the PGS, the city of Pittsburgh had a population of 334,563, with 67.6% of the population identified as European American and 27.1% as African American. Pittsburgh has a very stable population with 80% of the residents having been born in the state, compared to 62% on average across the U.S. Only 2.9% of Pittsburgh inhabitants are foreign born compared to 8% across the U.S. and only 2% of the City's population is not fluent in English. More than half of the residents reported living in the same household over the past 5 years. The rate of poverty in Pittsburgh is about twice the rate for the state on average: the median annual income in 2000 was \$28,588 and 20% of the population was reported to live below the poverty level (U.S. Census, 2000).

The main sources of information for compiling the housing database for the PGS were the city database for 911 calls and the post office database. The 80 neighborhoods were divided in 23 'disadvantaged' and 66 'non-disadvantaged' neighborhoods using information on poverty from the 1990 Census. The final neighborhood comprised the business district downtown, and so was not included in the enumeration. Neighborhoods in which at least 25% of the families were living at or below the poverty level were fully enumerated (i.e., all homes were contacted to determine if the household contained an eligible girl), and a random selection of 50% of the households in all other neighborhoods were enumerated during 1998 and 1999. A total of 103,238 households were enumerated, leading to the identification of 3,241 age eligible girls. A team of supervisors closely monitored the accuracy and veracity of the work of the staff. In order to evaluate the success of the enumeration, the identified sample was compared to the 2000 Census. The percentage of girls identified by the enumeration out of the total listed by the Census was 83.7%. Of the 2,992 eligible families 2,875 (96%) were successfully re-contacted to determine their willingness to participate in the longitudinal study. Of those families, 85% agreed to participate, resulting in a total sample size of 2,451. The proportion of girls successfully identified did not differ between the neighborhoods that were sampled at the 50% and 100% rate.

The 2,451 girls were relatively evenly distributed across the 4 age groups (5–8 years). Approximately half of the girls were African American (52%), 41% were European American, and the remaining girls were described as multiracial or representing another race. Demographic characteristics of the PGS sample are presented in Table 1. In the first assessment wave, nearly all the primary caregivers were biological mothers (92%). More than half of the caregivers were cohabiting with a husband or partner and about 47% of parents had completed 12 years or less of education.

Retention has been very high ranging from 97.2% in Year 02 to 89.4% in Year 08. Some of the variability in retention from year to year is due to difficulty tracking participants; a minority of families has refused to participate over the years (e.g., 7% for the most recent phase of data collection). Comparisons of those assessed and those not assessed at each wave have indicated that non-participation has been greater among families not receiving public assistance and among families of European American girls.

Procedures and Measures of the PGS

Approval for all study procedures was obtained from the University of Pittsburgh Institutional Review Board. Written informed consent from the caregiver and verbal assent from the child were obtained prior to data collection. Annual interviews are conducted separately for the parent and child in the home by trained interviewers using a laptop computer. Parents also completed a pen-and-paper booklet containing questionnaires and more recently have completed these questionnaires via computer. Following wave 7 of data collection, when the computer-assisted interview was introduced to the caregivers, additional data were collected on satisfaction with the method. The majority of parents felt that the electronic method was easier (97.2%) and faster (95.5%) than the paper and pencil method. Most parents (55.3%) report using a computer every day with 27.4% reporting using a computer once in a while, 13.4% reporting rarely using a computer, and 3.9% reporting the PGS interview as their first time using a computer. Although different methods may introduce differential measurement error, providing methods that best fit the needs of the respondent increases the likelihood of obtaining reliable and valid data. Moreover, the method of data collection (i.e., self-report without interviewer involvement) remained constant, and only the physical aspect of the data collection (i.e., filling in a circle versus selecting a response with a mouse click) changed. Therefore, we don't anticipate measurable changes in the reliability and validity of the data.

The interviewers are non-clinicians who are trained to administer the interview in an appropriate professional manner, to be non-judgmental in hearing responses to questions, and to express concern, but not intervene, when information is shared. Affirmative responses to some questions result in the computer prompting the interview to explain to the youth that information that she has shared that is relevant to her imminent safety will be discussed with the primary caregiver. These include sexual abuse, suicidal ideation or behavior, and non-suicidal self-injurious behaviors (e.g., cutting). Interviewers page a licensed clinician from the home, who discusses the information with the interviewer and then the caregiver and decides on a plan of action. The University of Pittsburgh has an internal child abuse team that is consulted by the clinician in cases where the procedures that need to be followed are not clear.

Measures are developmentally targeted such that age-appropriate versions of measures within a domain (e.g., delinquency) are introduced at different developmental periods. Informants include the youth (beginning at age 6), primary caregiver, teacher, and interviewer. The main domains covered include disruptive behavior, substance use, other disorders, temperamental dispositions, personal resources, trauma, peer relations, physical health, sexual behavior, caregiving environment, and the neighborhood environment. Areas assessed within each domain are listed in Table 2.

One of the challenges in conducting longitudinal studies in childhood, however, is maintaining the integrity of the constructs being measured over time. To a large extent, the protocol for the PGS has been guided by the published psychometrics for individual measures, such as the Child Symptom Inventory family of measures (Gadow & Sprafkin, 1996), and by studies conducted on the reliability and validity of child informants (e.g., Loeber et al., 1989). When instruments changed to accommodate the developmental level of the child, we typically conduct one assessment wave in which both instruments are included so that correlations could be generated within a given year.

Teacher data are obtained by questionnaire booklets, which are mostly hand-delivered to schools. Caregivers identify the teacher who knows the child the best during her annual interview. In each year, the teacher data collection wave begins in November so all teachers have known the girl for at least 2 months. Teachers are reimbursed for their time with \$20.00 gift certificates to local stores.

Analyses of disorder and symptom prevalence are typically conducted with weighted data to correct for the over-sampling of the low-income neighborhoods in order to generate prevalence rates that are representative of the population in the City of Pittsburgh. This weight variable was generated by comparing the proportion of neighborhoods represented in the study to the proportion of neighborhoods in the city of Pittsburgh in which girls in the same age range were living (using data from the 2000 U.S. Census). Thus the low-income neighborhoods were over-represented in the PGS compared with the census data by a ratio of 1.82:1. When adjusted to maintain the total sample size of 2451, this ratio produced weightings of 0.67 for the low-income neighborhoods, and 1.23 for the higher income neighborhoods.

Although income data have been collected in terms of annual or monthly income, refusals and lack of specific information was common. In addition, seasonal or intermittent work resulted in average monthly incomes that did not adequately reflect the families' economic situations. In most analyses, therefore, we have used receipt of public assistance to reflect economic strain or poverty. Receipt of public assistance includes participation in the Women, Infants, and Children Program (WIC), food stamps, Medicaid insurance, and/or temporary assistance to needy families (TANF). Receipt of public assistance is associated with race in the PGS. Twice as many families of African American girls received public assistance as families of non-African American girls (54.7% versus 21.2%). Despite the fact that the families were oversampled by low-income neighborhood, a sizable number of families did not receive public assistance (61.1%), with 45.3 of the families of African American girls not receiving public assistance. Thus, although poverty and race are confounded, the distribution of receipt of public assistance across race provided enough power to simultaneously test race and poverty effects.

Depending on the goal of a given set of analyses, data may be analyzed by assessment year or wave or by age. With the availability of models such as generalized estimating equations (GEE; Liang & Zeger, 1986) that are designed to accommodate nested, unbalanced longitudinal designs in which some children provide more data points than others, analyses by age in the context of an accelerated longitudinal design can be achieved.

Key Findings from the PGS

Prevalence and Expression of Conduct Disorder in Girls

Primary Aims—One contributing factor to the dearth of research on female disruptive and delinquent behaviors is the general lack of consensus on how to define and assess female problem behaviors, with somewhat divergent approaches being taken within the fields of psychiatry, developmental psychopathology, and criminology. The study of CD specifically is characterized by several nosologic controversies that center on the most common age of onset (e.g., childhood versus adolescent)(e.g., Moffitt, 2003) and the most valid symptom threshold (2 versus 3) (e.g., Zoccolillo, Tremblay & Vitaro, 1996). These and other issues have been a focus of the initial analyses from the PGS.

Key Findings—First, based on data from the first wave of the study (ages 5–8 years), Hipwell et al. (2002) reported on the prevalence of DSM-IV CD and ODD, antisocial behaviors, and relational aggression as informed by the girl, her caregiver and her teacher. Between 3.5% and 4.7% of the girls qualified for an estimated diagnosis of Oppositional-Defiant Disorder (ODD) according to parent report, and as such it was the most common diagnosis in each age cohort. Diagnoses of CD were created using a threshold of 3 symptoms as described by DSM-IV, and also of 2 symptoms as suggested by the literature for girls (e.g., Zoccolillo, Tremblay & Vitaro, 1996). Using the parent report and the DSM-IV criterion, very few girls were classified as having CD in Year 01 (between 0.5 and 1.3%). Using the more lenient threshold of 2 or more symptoms, between 1.6 and 2.6% of the girls were categorized as having CD. When the child's report for the 7- and 8-year olds was combined with the parent's report, the rates increased to

2.8% and 2.4% according to DSM-IV criteria, and to 6.3% and 5.7% using a threshold of 2 or more symptoms. The prevalence of DSM-IV CD and ODD, antisocial behaviors, and relational aggression was similar across the four age cohorts. Where there were differences, parents of younger girls tended to report fewer problematic behaviors compared with parents of older girls. As hypothesized girls deviant on several domains relative to their peers were over-represented in disadvantaged neighborhoods.

Second, the issue of the most common age of onset of CD in girls was addressed by examining the age at which the first symptom of CD was endorsed (as per DSM-IV definition of age of onset) among girls who met criteria for CD by combined self and caregiver report (Keenan et al., under review). The weighted prevalence of CD ranged from approximately 5–9% across ages 7 to 14 years of age. Of the 510 girls who met criteria for DSM-IV CD in at least one assessment year, 469 (92.0%) had an age of onset between 7 and 9 years of age and 41 (8.0%) had an age of onset between 10 and 14 years of age. An age of onset after 9 years of age, therefore, was extremely rare in this sample.

Third, the debate regarding changing the symptom threshold for girls was addressed by computing the likelihood of impairment at each symptom level (Keenan et al., under review). Parent-rated impairment was significantly higher at 3 or more symptoms than at 0, 1, or 2 symptoms. For example, the likelihood of impairment was twice as high among girls manifesting 3 symptoms compared to those with 2 symptoms ($OR = 2.1, p < 0.001$). The likelihood of teacher-rated impairment was increased by 70% among girls manifesting 3 symptoms compared to those with 2 symptoms ($OR = 1.7, p = 0.002$). But there was also evidence of a linear association between symptoms when teacher and youth-reported impairment were the dependent measures. Thus, the data did not fully defend the threshold of 3 symptoms of CD, but there was even less support for changing the symptom threshold.

Integration with Previous Research—To integrate these findings from the PGS with past research, it is important to note that the prevalence of CD in girls has been highly inconsistent across studies. In the Dunedin Longitudinal Study, prevalence of DSM-IV CD in girls ranged from 18 to 26% at ages 11 through 18 years (Moffitt et al., 2001). This rate is higher than that found in the PGS. In a more recent cross-sectional, epidemiologic study, Maughan et al. (2004) reported that the prevalence of CD in girls was less than 1% at ages 5 to 12 years, and between 1.4% and 3.4% at ages 13 to 15 years. This rate that is lower than what was found in the PGS. Some of the discrepancy in prevalence of CD in girls among studies can be attributed to measure, and some to sampling. For example, Maughan et al. used a screening measure to determine whether the remaining CD symptoms should be assessed. Following this, clinician based diagnoses were generated. It is possible that the screening measure was not very sensitive for girls. In addition, the demographics of the sample studied by Maughan et al., are different than that in the PGS, even after weighting back to the population of the City of Pittsburgh; 91% of their participants were white, and about 20% were living in single parent households

Very few studies have been conducted on the age of onset of CD in girls, as defined by the age at which the first symptom is manifest. Of those that do exist, the results are generally consistent with our findings. In preparation for DSM-IV, Lahey et al (1998) examined age of onset of CD using retrospective report in a clinical sample of 4–17 year olds and a household sample of 9–17 years olds. Only 24 girls met criteria for CD in the clinic sample. Of those, 15 (62.5%) reported a childhood onset. Close to three-quarters of the 19 girls meeting criteria for CD in the household sample had a childhood onset (Lahey et al., 1998).

The debate around symptom threshold for CD in girls is equally relevant to boys and other DSM disorders. Fergusson & Horwood (1995) have argued that categorical diagnoses are based on relatively artificial cut-points and result in a loss of information on severity given the known

dose-response nature of the association between symptoms of CD and outcomes. In balance, data from the PGS point more towards retaining rather than revising the current symptom threshold, given the results from parent-rated impairment. But additional data, including data from clinical samples and other methods for assessing impairment and disability, are needed to determine symptom threshold.

Environmental Influences on Girls Mental Health

Primary Aims—As stated earlier, our conceptual model includes testing hypothesized sex-specific environmental influences on girls' mental health. Because girls tend to be more oriented towards relationships and gaining social approval compared with boys (e.g. Gabriel & Gardner, 1999; Maccoby, 1990), it is possible that they may be especially vulnerable to the effects of harsh parenting and low levels of parental warmth. Several investigators have proposed that this sensitivity to interpersonal stress and conflict places girls at higher risk for psychopathology (Chamberlain & Reid, 1994; Crawford et al., 2001; Dembo et al., 1998). At the same time, our model is significantly influenced by the child effects model (Bell, 1968), which recognizes that children's behavior elicits responses from the caregiving environment. In the case of girls, and specifically girls manifesting CD symptoms, there may be an intensified response by parents to behaviors that are relatively uncommon among girls. Thus, we are interested in testing reciprocal, transactional models of child and environmental effects on girls' mental health problems.

Key Findings—The temporal ordering of parent and child effects on each other over a six year period (child ages 7–12) has been tested with a focus on two dimensions of parenting behavior, low parental warmth and harsh parenting (Hipwell et al., 2008). Low parental warmth was assessed by summing six items of the Parent-Child Rating Scale (PCRS, Loeber et al., 1998), such as "How often have you wished she would just leave you alone." Harsh punishment was assessed using caregiver reports on the Conflict Tactics Scale: Parent-child version (CTSPC; Straus et al., 1998): responses to the five items from the psychological aggression subscale and a single item on spanking were summed.

In the PGS, increases in conduct problems in the following year were predicted by harsh punishment ($OR=1.26$, $p<0.001$, 95% $CI=1.19 - 1.32$) and low parental warmth ($OR=1.23$, $p<0.001$, 95% $CI=1.17 - 1.30$) in the previous year, controlling for earlier conduct problems. Girls conduct problems were predictive of increases in harsh punishment ($OR = 1.008$, $p<0.001$, 95% $CI=1.004, 1.012$) as was low parental warmth ($OR = 1.006$, $p<0.01$, 95% $CI=1.002, 1.009$) in the following year, controlling for earlier parenting. Race did not moderate these associations. Overall, the amount of variance in changes in girls' conduct problems explained by either parenting variable was less than the amount of variance in changes in parental warmth and harsh punishment explained by girls' conduct problems.

Integration with Previous Research—Although child effects on parenting were proposed several decades ago (e.g. Bell 1968; Sameroff, 1975) there has been relatively little empirical investigation, and as a result, empirical support for child effects on parenting, in comparison to parent effects on child behavior. This is especially true for CD, for which family and parenting factors have been a focus over the past 20 years (e.g., DeKlyen, Speltz, & Greenberg, 1998; Dodge et al., 1994; Patterson, 1982; Patterson et al., 1989; Viding et al., 2009). Stattin & Kerr (2000) began to expand on and challenge the research on parenting effects, by demonstrating that parental behavior such as monitoring, is in part dependent on child disclosure to the parent, which in turn is association with disruptive behavior. Recently, infant emotion dysregulation has been hypothesized as etiologically relevant to the development of CD, in part because of the negative responses elicited from the caregiving environment (Keenan & Shaw, 2003). The present results support the testing of child effects across development,

and exploring models that incorporate the possibility of reciprocal relations of parents and children on each other in the emergence and exacerbation of CD symptoms.

Development of Substance Use in Girls

Primary Aims—One primary sub-study of the PGS focuses on the development of substance use in girls, funded by the National Institute on Drug Abuse. It addresses the critical need to understand the early origins and course of female substance use, substance-related problems, and substance use disorders (SUDs). Misuse of substances is the leading preventable cause of morbidity and mortality in females, and is associated with distinct social, physical, and mental health consequences for women (Institute of Medicine, 2004). Consistent with the overall PGS, the conceptual framework used to test hypotheses regarding the development of substance use in girls acknowledges individual differences in the timing and pace of development, multiple pathways toward and away from substance involvement, and the dynamic interaction of multiple systems (e.g., family, school, community) and levels of influence (Masten et al., 2008). The aims of the substance use sub-study are to (1) describe developmental sequences of substance use during the transition from childhood into adolescence within and across substances; (2) examine developmental sequences of substance use by girls in conjunction with the developmental course of co-occurring conditions, especially psychopathology and other behavior problems; and (3) determine proximal and distal risk and protective factors for different developmental sequences of substance use in girls.

Key Findings—Recognizing that developmental pathways of substance use may begin with cognitive precursors of substance use (e.g., substance use expectancies, attitudes toward substance use, and intentions to use), we included, starting in Year 3 (ages 7–10) measures of substance use expectancies (which are beliefs regarding the positive and negative effects of substance use), attitudes toward substance use, and intentions to use specific substances in the next year. Also beginning in Year 3, girls provide annual data on past year substance use (i.e., frequency, quantity). Upon initiation of tobacco and marijuana use, we collect data from girls on their report of subjective effects of tobacco and marijuana use, because individual differences in response to drug effects may predict progression of use (e.g., Eissenberg & Balster, 2000). To track the onset and course of substance use disorders, starting at age 12, girls report on substance-related problems in the past year using the computerized version of the Composite International Diagnostic Interview-Substance Abuse Module, version 4.1 (CIDI-SAM; Cottler, 2000).

Analyses to date have focused on characterizing developmental changes in alcohol expectancies, and changes in the prevalence of past year use of alcohol. Positive alcohol expectancies (e.g., alcohol makes someone feel good, or feel happy), in particular, have been associated with level of alcohol use (Jones, Corbin & Fromme, 2001). Analyses of positive alcohol expectancy data collected annually at ages 7–10 indicated both developmental change and race differences in positive alcohol expectancies. Specifically, positive alcohol expectancies generally increased among European American girls over ages 7–10 (Hipwell et al., 2005), and greater physical aggression was associated with higher initial positive alcohol expectancies ($\beta = 0.06, p < 0.05$) among European American girls (Chung et al., 2008). However, among African-American girls, demographic and neighborhood characteristics, physical aggression, depression, and early alcohol use were not associated with positive alcohol expectancies (Chung et al., 2008). These early findings suggest race differences in predictors and pathways of early substance use, which will be a primary focus as the girls move into the risk period for more regular substance use and substance use disorders.

In the two oldest PGS cohorts, the prevalence of alcohol use without parental permission between ages 8–10 was, not surprisingly, low (less than 3% in any year; Hipwell et al.,

2005). Among the girls who reported early alcohol use, most reported only “sips” in the context of experimental use. There was little evidence of a more regular pattern of alcohol use during ages 8–10. An important finding is that although African American, compared to European American, girls reported higher rates of experimental alcohol use during childhood (i.e., through age 10; at age 10: 3.7% versus 0.4%, respectively, in the two oldest cohorts), European American girls were more likely to report past year alcohol use starting at age 11 (14.5% versus 7.1%, respectively in the two oldest cohorts). Also, European American girls showed, on average, more rapid increase in report of past year alcohol use through age 15 (White, Loeber, & Chung, in press). By age 15, 45% of European American girls reported past year alcohol use, compared to 24% of African American girls in the two oldest cohorts (White et al., in press).

This developmental “switch” in the prevalence of past year use of alcohol by race has important implications for understanding race differences in the development of substance use. Specifically, PGS data from the two oldest cohorts suggest that African American girls may be more likely, compared to European American girls, to experiment with alcohol during childhood, but that European American girls appear to be at greater risk, relative to African American girls, for initiation of alcohol use during adolescence, and possibly for progression to more regular alcohol use following initiation of alcohol use during adolescence.

Integration with Previous Research—Little data on the prevalence of alcohol use during childhood exist, and PGS serves as an important resource that helps to address this gap. Whereas national data on adolescent substance use indicate that, during adolescence, African American youth are less likely to report alcohol use compared to European American youth (e.g., Johnston et al., 2009), during childhood, African American youth are not less likely to have used alcohol compared to other racial groups (Donovan, 2007). In this regard, PGS data are consistent with other surveys that indicate a “developmental switch” in the prevalence of alcohol use during the transition to adolescence as a function of race. The prevalence of past year alcohol use during adolescence in PGS is generally similar to rates obtained in national surveys (e.g., Office of Applied Studies, 2009). In addition, PGS data on the increase in positive alcohol expectancies with age among European American girls support the role of positive alcohol expectancies in predicting alcohol use in this racial group. Initial PGS findings highlight racial differences in risk for alcohol use, the importance of timing of exposure in relation to risk for progression of use, and point to positive alcohol expectancies as a modifiable early risk factor that could be targeted in prevention efforts for certain risk groups.

Sexual Development and Reproductive Mental Health

Primary Aims

In recent years, concern has been raised about girls’ involvement in sexual activity at progressively younger ages (Abma, Martinez, Mosher & Dawson, 2004; Albert, Brown & Flanigan, 2003). Engaging in sexual intercourse prior to age 15 is associated with increased rates of unwanted pregnancy and sexually transmitted infections (e.g. Kaestle, Halpern, Miller & Ford, 2005; Manlove, Franzetta, McKinney, Papillo & Terry-Humen, 2004). Although data suggest that heterosexual behavior develops in an orderly, progressive sequence in later adolescence (e.g. Brooks-Gunn & Paikoff, 1999; Hansen, Wolkenstein & Hahn, 1992; Jacobsen, 1997), little is known about the prevalence of early emerging intimate behaviors or the psychosocial factors associated with these putative precursors to risky sexual behavior. Given consistent evidence that African American youth tend to initiate sexual intercourse earlier than European American youth (Centers for Disease Control and Prevention, 2004; Santelli et al., 2004), analyses conducted using data collected in the PGS also focused on the ways in which these early intimate behaviors and their psychosocial predictors differed by ethnicity.

Key Findings

Assessment of pre-sexual and sexual activity has been part of the PGS interview protocol since age 11 years. Girls who become pregnant and intend to become mothers, or who have already delivered are contacted for recruitment into a sub-study entitled the *Adjusting to Young Motherhood* study, in which 38 PGS participants are currently enrolled with ages at delivery ranging from 12 to 17 years of age. Data are being collected on the mother, grandmother, and infant when the infant is 4 and 12 months of age. Because data are not yet available from the *Adjusting to Young Motherhood* study, we report initial findings on pre-sexual and sexual activity and mental health. The goal of the first set of analyses was to understand intimate behavior in the preadolescent period and examine the prevalence and predictors of pre-coital sexually intimate behaviors (Hipwell et al., in press).

The key measure used to assess pre-sexual and risky sexual behavior is the Adolescent Sexual Activity Index (ASAI; Hansen, Paskett & Carter, 1999). Items ranging from spending time alone with a boy, to engaging in sexual intercourse, are scored as either 0 (*no*) or 1 (*yes*). When administered to young girls, the PGS used a ‘past year’ time frame instead of the ‘past 30 days’ of the original measure to enable low frequency behaviors to be captured. An additional item assessing girls’ participation in oral sex has also been administered since age 12. Fifteen DSM-IV symptoms of CD, 3 symptoms of impulsivity and 12 symptoms of depression were assessed using the Child Symptom Inventory-4 (CSI-4, Gadow & Sprafkin, 1996). Severity of anxiety symptoms was measured by girl report on the Screen for Child Anxiety and Related Emotional Disorders (Birmaher et al., 1997). Lifetime use of alcohol was assessed using the Nicotine, Alcohol and Drug Use scale adapted from questions on quantity and frequency of substance use developed for the Rutgers Health and Human Development Project (Pandina, Labouvie & White, 1984). Low parental warmth was assessed using the PCRS (Loeber et al., 1998) as described previously, and Poor Parent-child Communication was assessed using 4 parent-rated items from the Supervision Involvement Scale (Loeber et al., 1998). These items assessed the parent’s perception of the amount of parent-daughter discussions by rating how recently and how frequently the parent had talked with his/her daughter about her plans for the coming day, and about what she had actually done. Deviant Peer Behaviors (e.g. interpersonal aggression, stealing, destruction of property, and substance use) were assessed using girls’ report on the 12-item Peer Delinquency Scale (Loeber et al., 1998), and social self worth was assessed with 8 items (e.g. “I have always been the kind of kid who makes friends easily”) on the Perception of Peers and Self Inventory (Rudolph, Hammen & Burge, 1995). Other interpersonal risk factors included girls’ report of low assertiveness using the Social Skills Rating Scale (Gresham & Elliott, 1990), and susceptibility to peer pressure using four items from the Extreme Peer Orientation scale (Fulgini & Eccles, 1993). Finally, onset of menarche was assessed using a single item scored as 0 (*no*) or 1 (*yes*) on the Pubertal Development Scale (Petersen, Crockett, Richards & Boxer, 1988) administered at age 11 years.

Cluster analysis of girls’ reports of intimate behavior at age 12 revealed three groups; none, mild (e.g. holding hands) and moderate (e.g. laying together), with a sizeable minority of girls (6.2%) falling in the latter group that comprised a broad range of sexually intimate behaviors. African American girls reported higher rates of both mild and moderate sexually intimate behaviors compared with European American girls. As age 11 intimate behavior increased, the odds of being in the moderate group at age 12 increased by 3.6 (95% CI=2.70–4.89) relative to the ‘none’ group, and by 1.6 (95% CI = 1.24–1.93) relative to the ‘mild’ group.

After controlling for the significant effects of age 11 intimate behaviors, lifetime alcohol use, poor parent-child communication, deviant peer behavior, onset of menarche, and interactions between race and impulsivity, social self-worth and depression uniquely increased the odds of engaging in moderately intimate behaviors at age 12 years. For European American girls only, high levels of impulsivity and low social self-worth were associated with a higher likelihood

of engaging in moderate intimate behaviors, whereas high levels of depressive symptoms reduced the odds.

Although the factors associated with progression of intimate behaviors fall within the domain of problematic behavior, the above analyses are on relatively normative pre-sexual behaviors and thus do not necessarily address concerns about risky sexual behavior. For young adult women, and African American women specifically, high-risk heterosexual sexual activity accounts for a substantial number of new cases of HIV infection (CDC, 2009). For these reasons, we have begun to explore methods for classifying early “high-risk” sexual behavior in girls. Historically, the operationalization of sexually risky behavior across studies has been idiosyncratic or determined in a somewhat arbitrary way such as age at sexual debut. In the PGS, sexual and sexually risky behaviors in adolescent girls cluster in distinct ways. At age 15 years, a three class solution using latent curve analyses provided the best model fit (Low BIC=4,178; High Entropy = .90), representing low probability of pre-sexual behaviors (‘Low’), high probability of pre-sexual behavior (‘Moderate’), and high probability of sexual behavior and/or sexual risk-taking (‘High’) (Hipwell et al., under review). Girls are more likely to be in the Moderate compared with the Low group if they report more deviant peers ($OR = 1.12$, 95% $CI = 1.02-1.22$), and both average and fast rates of pubertal maturation ($OR = 1.99$, 95% $CI = 1.05-3.77$ and $OR = 1.78$, 95% $CI = 1.04-1.90$, respectively). Lower levels of assertiveness also increase the odds of membership in the Low, compared with the Moderate, pre-sexual group ($OR = .93$, 95% $CI = .86-.99$). Substance use ($OR = 3.04$, 95% $CI = 1.72-5.36$), higher levels of depressed mood ($OR = 1.10$, 95% $CI = 1.03-1.16$) and lower levels of peer susceptibility ($OR = .55$, 95% $CI = .30-.99$) increase the odds of inclusion in the High sexual group relative to the Moderate group. In addition, older girls, and girls living in single parent families, are over-represented in the High compared with the Moderate group. Importantly, girls classified in the High group are similar to Moderate group girls on a number of key variables. There are no differences between the two groups in the severity of disruptive behavior problems, impulsivity, social anxiety, deviant peer affiliation, assertiveness, and rate of pubertal maturation.

Integration with Previous Research

Differentiating sexual activity that does not confer risk for mental or physical health problems is a goal of this sub-study. Even at a relatively early age, it is possible to differentiate the two, and sexual activity does not always occur in the context of deviant behavior. This is especially true for African American girls, who report more positive attitudes towards sexuality than European American girls (Watts & Nagy, 2000). Thus, cultural attitudes toward sexual activity need to be included in models of sexual development and mental health in females.

Another major public health concern among adolescent females is early pregnancy and childbearing. Teenage parenthood often bodes ill for the offspring including greater likelihood of low birth weight (Cornelius et al., 1999a), deficits in cognitive and academic functioning (Hetherington, 1998) exposure to abuse and neglect (Coley & Chase-Lansdale, 1998), and development of aggressive and antisocial behavior in adolescence (Conseur et al., 1997; Haveman et al., 1997). Although poor quality parenting is known to contribute to these risks for offspring (e.g. Barratt & Roach, 1995; Hann et al., 1994), it is also possible that pre-existing characteristics of the mother (such as emotional or behavioral problems in childhood) account for at least some of these parenting difficulties and adverse outcomes in children (Hoffman, 1998). The relative import of ‘selection effects’, due to pre-pregnancy characteristics such as childhood mental health problems (Rutter et al., 1998), versus ‘elicitation effects’, due to stressors associated with young motherhood (Osofsky et al., 1993), on teenage adjustment and parenting has rarely been investigated.

The PGS sample provides a unique opportunity to examine developmental processes spanning the pre-conception period of childhood and adolescence that place girls at risk for poor adjustment to parenthood. In particular, selection versus elicitation processes can be examined by integrating developmental trajectories of psychopathology and psychosocial risks (e.g. experience of poor quality parenting, peer victimization) with mental health data collected before and after childbirth. Most prior work examining risk factors associated with postpartum mood disorders or difficulties in caregiving have relied on the retrospective reports of already-pregnant women (see meta-analyses by Beck, 2001; O'Hara & Swain, 1996). It is well established, however, that for 33%-51% of women, postpartum mood disorders are an exacerbation or recurrence of mental health problems already present during pregnancy or earlier (Evans, Heron et al., 2001; Gotlib, Whiffen et al., 1989; Stowe, Hostetter & Newport, 2005). With data from the PGS it should become possible to identify women most at risk for postpartum psychopathology and/or impaired caregiving *before* pregnancy, and document developmentally specific risk factors that can inform tailored and optimally timed interventions.

Precursors to Depression in Girls

Primary Aims—After several years into data collection for the main PGS, the fact that depressive disorders would be a more likely outcome than CD in this sample of girls led the team to consider how best to use the framework and resources of the PGS to contribute to the existing literature on depression. Depressive disorders are among the leading contributors to disability and mortality in women around the world, rivaling cardiovascular disease (Murray & Lopez, 1996). Thus, preventing depression in adolescent and adult females would result in an enormous improvement in women's health. The development of effective preventive interventions requires specific information about the developmental phenomenology of the disorder, including the individual differences in basic psychological processes that precede the onset of disorder. Thus, the aims of the precursors to depression study evolved from perceived gaps in the literature that needed to be filled in order to develop effective preventive interventions including the identification of individual vulnerabilities in childhood that serve as precursors to mood disorders and the identification of sub-syndromal phenotypes of mood disorders. In addition, the hypothesized predictors of depression included in this sub-study are derived from research on sex differences in psychological processes that are theoretically relevant to the development of depression (REF).

Key Findings—Participants in the *Precursors to Depression* sub-study were recruited from the youngest sample of the PGS. We elected to over-sample girls who were already above average on depression scores as measured by youth or parent report. All eight-year old girls who scored in the upper quartile by their own report on the Short Moods and Feelings Questionnaire (SMFQ; Angold et al., 1995) or by maternal report on the depression subscale of the Child Symptom Inventory (CSI; Gadow & Sprafkin, 1996) ($n = 135$) and a random selection of the remainder ($n = 136$) were targeted for recruitment. Additional inclusion criteria were residence with biological mother in Allegheny County. Eight of the targeted families were not eligible at the time of recruitment because the biological mother had died, the family had moved out of Allegheny County, or the family was no longer participating in the main study and could not be contacted. Of the 263 families eligible to participate, 232 (88.2%) agreed to participate and completed the laboratory assessment, 25 (9.5%) families refused to participate, and 6 (2.3%) agreed but could not be scheduled for an assessment.

Because the aim of the study was to test precursors to DSM-IV depressive disorders, this sub-study required a different set of methods than that used in the main PGS. Specifically the administration of a diagnostic interview and the use of controlled, manipulated stimuli to elicit individual differences in behavior and emotions that could be reliably observed were optimal

given the aims. Girls and their caregivers, therefore, come to the laboratory for an assessment that is independent of the home interview they complete for the PGS. The Kiddie-SADS-PL (Kaufman et al., 1997) is used to generate DSM-IV symptoms and diagnoses by youth and parent report. The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID; First et al., 2002) is administered to the mother to generate current and past year symptoms and diagnoses of depression.

The assessment of hypothesized behavioral endophenotypes includes response to the autobiographical memory task, level of compliance in an assertiveness task, emotional and behavioral response to a problem-solving task, and response to a pain stimulus. These measures are designed to capture individual differences in response to controlled stimuli. Thus, autobiographical memory is assessed via the Autobiographical Memory Test (Williams & Broadbent, 1986) in which the specificity of a memory generated in response to a set of positive and negative cue words is coded. In addition to self-reported emotion expression and regulation using standardized measures (e.g., Children's Sadness/Anger Management Scales; Zeman, Shipman & Penza-Clyve, 2001), girls' expressions of positive and negative emotion are coded during the mother-daughter problem-solving task using the Iowa Family Interaction Coding Scales (Melby & Conger 2001). Pain tolerance and threshold is operationalized as immersion time and latency to highest pain rating during the Cold Pressor Task (von Bayer et al., 2005.)

Our first goal was to test the stability and predictive utility of depressive symptoms during the preadolescent period. To this end, we generated stability coefficients and tested the predictive utility of depression symptoms to later disorders. The stability coefficients for DSM-IV symptom counts over a 1–2 year interval were in the moderate range (i.e., intraclass coefficients of .40 to .59 for continuous symptom counts and kendall's tau-b coefficients of .34 to .39 for symptom level stability) (Keenan et al., 2008). About one third of the girls who met criteria for a depressive disorder at age 9 also met criteria at ages 10 or 11, and there was a more than 4-fold increase in the risk of subsequent depressive disorder given a depressive disorder at age 9. Among girls who did not meet criteria for a depressive disorder at age 9, the odds of meeting criteria for depressive disorders and for demonstrating impairment at ages 10 or 11 increased by 1.9 and 1.7, respectively, for every increase in the number of depression symptoms (Keenan et al., 2008). These data are evidence of significant morbidity associated with preadolescent depressive symptoms and disorders in girls.

In these analyses, the stability and predictive utility of childhood depressive symptoms and disorders, race did not explain variance in stability, despite the fact that African American girls were more likely to screen high on depression at study entry and continued to report higher numbers of symptoms at ages 9–11 than European American girls (Keenan, Feng, Hipwell et al., 2009). This suggests that there are specific stressors for African Americans, such as a high level of perceived racism or low ethnic identity, that increase the possibility of transitioning from vulnerability to being symptomatic among preadolescent girls.

One of the novel hypotheses tested in this sub-study is that *inhibition* of the expression of negative emotion may be particularly relevant for the development of depression in girls. Normative development studies indicate that girls are more likely than boys to inhibit the expression of negative emotion, and that this strategy for regulating emotion can have negative consequences for psychological functioning (see Keenan & Hipwell, 2005). To test this hypothesis, inhibited and disinhibited emotion expression was measured via self-report and observed during a mother-daughter problem-solving task at age 9. Results demonstrate that both inhibited and disinhibited patterns of emotion expression are associated with depressive symptoms and impairment, but inhibition of the expression of negative emotion accounts for the majority of the variance in depressive symptoms and impairment ratings. Approximately 24% of the variance in youth reported depressive symptoms was accounted for by youth-

reported inhibited expression of negative emotion, and an additional 4% was accounted for by youth-reported disinhibited expression ($F [2,227] = 44.57, p < .001$, adjusted $R^2 = .276$). Youth-reported inhibited expression of negative emotion explained a small amount of variance in maternal report of MDD symptoms ($F [1,228] = 12.57, p < .01$, adjusted $R^2 = .048$), and measures of disinhibited emotion expression did not significantly add to the model (Keenan et al., 2009a). These results suggest that inhibition of anger and sadness may be an equally salient, if not more salient, deficit in emotion regulation for depressive symptoms and impairment among girls.

As is the case for CD, we also are examining the impact of moderation of the caregiving environment on the emergence of depression symptoms using both self-report and observational data. Feng et al. (2009) test associations between girls' observed emotion expression during a mother-daughter problem-solving task at age 9 and depression symptoms at age 10, controlling for age 9 symptoms, as a function of parental control. Parental psychological control was measured using a subscale from the Children's Report on Parent Behavior Inventory (Schaefer, 1965), in which the degree of intrusiveness and possessiveness in parental behavior (e.g., "is always telling me how I should behave") is measured according to the child's report. The results supported a moderating effect of the caregiving environment on risk for depression. Low positive emotion expression was predictive of depression only in context of high ($\beta = -.29, p < .001$) and average ($\beta = -.13, p < .05$) levels of parental psychological control. When parental psychological control was low, low positive emotion expression was not associated with later depressive symptoms.

Another avenue being explored in the depression sub-study is the developmental interface between individual differences in the experience of physical pain and depression. In addition to being a period during which sex differences in depression emerge, adolescence is associated with changes in pain tolerance (Lu et al., 2005) and physical complaints (LeResche et al., 2005), with sex differences in physical complaints emerging during this period (Kolip, 1997; LeResche et al., 2005). Thus, probing the unfolding of the relations between depression and pain in girls may reveal a developmental link between early individual differences in pain sensitivity and later risk for depression. Individual differences in pain tolerance and threshold are measured using a cold pressor task. Low threshold and tolerance for pain at age 10 is associated with depressive symptoms at ages 10 and 11, even after controlling for earlier depression symptoms. Interestingly, race and pubertal stage moderate the association. For example, race ($\beta = .547, p < .01$), and the interaction of race and pain tolerance ($\beta = .007, p < .05$), and a marginal effect of the interaction of puberty and pain tolerance ($\beta = -.003, p < .10$) were associated with youth reported depressive symptoms at age 11. Pain response and depression are more strongly associated among girls who have reached advanced stages of pubertal development and among European American girls (Keenan et al., 2009b). Differences in cultural beliefs about pain and depression, and differences in experiences in seeking and getting treatment for painful conditions may explain the moderating effects of race.

Integration with Previous Research—The *Precursors to Depression* sub-study builds on existing models of the development of depression in girls (e.g., Cyranowski et al., 2000; Hankin & Abramson, 2001; Nolen-Hoeksema & Girgus, 1994) by focusing on individual differences in psychological functioning during the preadolescent period that may serve as precursors to depressive disorders specifically for girls during adolescence. The data generated thus far provide support for the stability and clinical validity of depressive symptoms and disorders in non-referred preadolescent girls, suggesting that adolescent onset MDD may not emerge de novo, but rather represent a period during which depression symptoms are exacerbated or intensified. Moreover, what is emerging is that individual differences in psychological processes observed during the preadolescent period have relevance for emerging depression.

Our findings of the association between inhibited expression of negative emotion and depression is consistent with several studies of adults. For example, Gross and John (2003) demonstrated negative concurrent associations between suppression of negative emotion and several indices of well-being including autonomy, mastery, optimism, and depression. Bromberger and Matthews (1996) reported that women who reported holding their anger in, in comparison to women who were more likely to express their angry feelings, had higher depression scores three years later. That this association is observed at a young age and in conjunction with clinical meaningful assessments of depression symptoms is significant in terms of exploring mechanisms and method of prevention. Although successful interventions have been developed to reduce the expression of negative emotion as a means of reducing the risk of recurrent depression (e.g., Kovacs, et al., 2006), the data from the present study suggest that for preadolescent girls, and perhaps in particular for African American girls, interventions that target expression and assertion of one's emotional states may be needed.

Implications for Future Research, Policy, and Practice

The current balance of clinically relevant research has been weighted toward treatment of children with disorders as opposed to prevention of disorders. This balance is in part shaped by the relative lack of information on precursors and the relationship between early emerging symptoms and later disorders in children, and consequently few data on the mechanisms of onset. The broadening of phenotypic research to include early manifestations and developmental progressions to disorder or poor outcomes will help shift the balance toward more selected and perhaps even universal prevention-focused research.

A long-term goal of the PGS and the related sub-studies is to identify modifiable factors that are associated with exacerbation or amelioration of risk. To accomplish this we need to determine whether there are critical periods during which exposure to environmental stressors confers greater risk and if so, for girls with which types of diatheses. Specifying the link between environmental stressor and disorder by incorporating timing of exposure, and patterns of individual differences that translate to vulnerability once exposed to a stressor will be required for developing and implementing selected interventions and ultimately reducing the chronicity and burden of many forms of early emerging psychopathology.

The data summarized and presented here have important implications for the future of preventive interventions. Regarding timing of preventive interventions, our data indicate that the age at which conduct problems and depression emerge and signal a poor developmental trajectory for girls is during middle childhood and the preadolescent period, not adolescence. This means that prevention efforts need to be targeted during early childhood, prior to the onset of sub-syndromal or sub-threshold manifestations of disorders. Although we have begun to identify possible targets of preventive interventions, such as emotion expression for the prevention of depression, a more comprehensive assessment requires following all the girls through the primary risk periods for disorder. In addition, we will be able to distinguish between individual and environmental factors that appear to be causally related in that they precede the onset of the emergence of symptoms, from those that serve to exacerbate emerging psychopathology, and from those that account for recurrence and/or chronicity.

In terms of specificity of prevention efforts, the developmental trajectories and correlates of attitudes toward substance use and sexual behavior are different for African American and European American girls, highlighting the need to conceptualize race as a potential moderator of prevention efficacy. These findings are not simply a function of living in poverty, given that race continued to moderate associations after controlling for poverty, and will require further exploration to determine the cultural beliefs and practices the yield different profiles of risk for European and African American girls. For example, data have been collected on ethnic

identity, religiosity, and parent-child communication. These personal and family resources have been shown to be protective for African American youth (e.g., Grant et al., 2000).

Although parenting has typically been incorporated into prevention and intervention models of disruptive behavior problems, the data reviewed here point towards the role of parenting in the development of depression. The parenting environment moderates the role of individual differences in emotional functioning in conferring risk for depression, and operates in a reciprocal pattern with girls depression symptoms leading to increases in depressive symptoms overtime. Thus, the strengths and weaknesses in the caregiving environment need also be incorporated into the prevention of depression in girls.

The short and long-term goals for the Pittsburgh Girls Studies will be to continue to generate data that can be used to inform debates about nosology, define critical periods of risk for onset versus exacerbation of mental health problems, reveal individual vulnerabilities and the contexts in which such vulnerabilities are likely to confer risk, and determine for which disorders and in what context does race moderate the risk for and progression to mental health problems.

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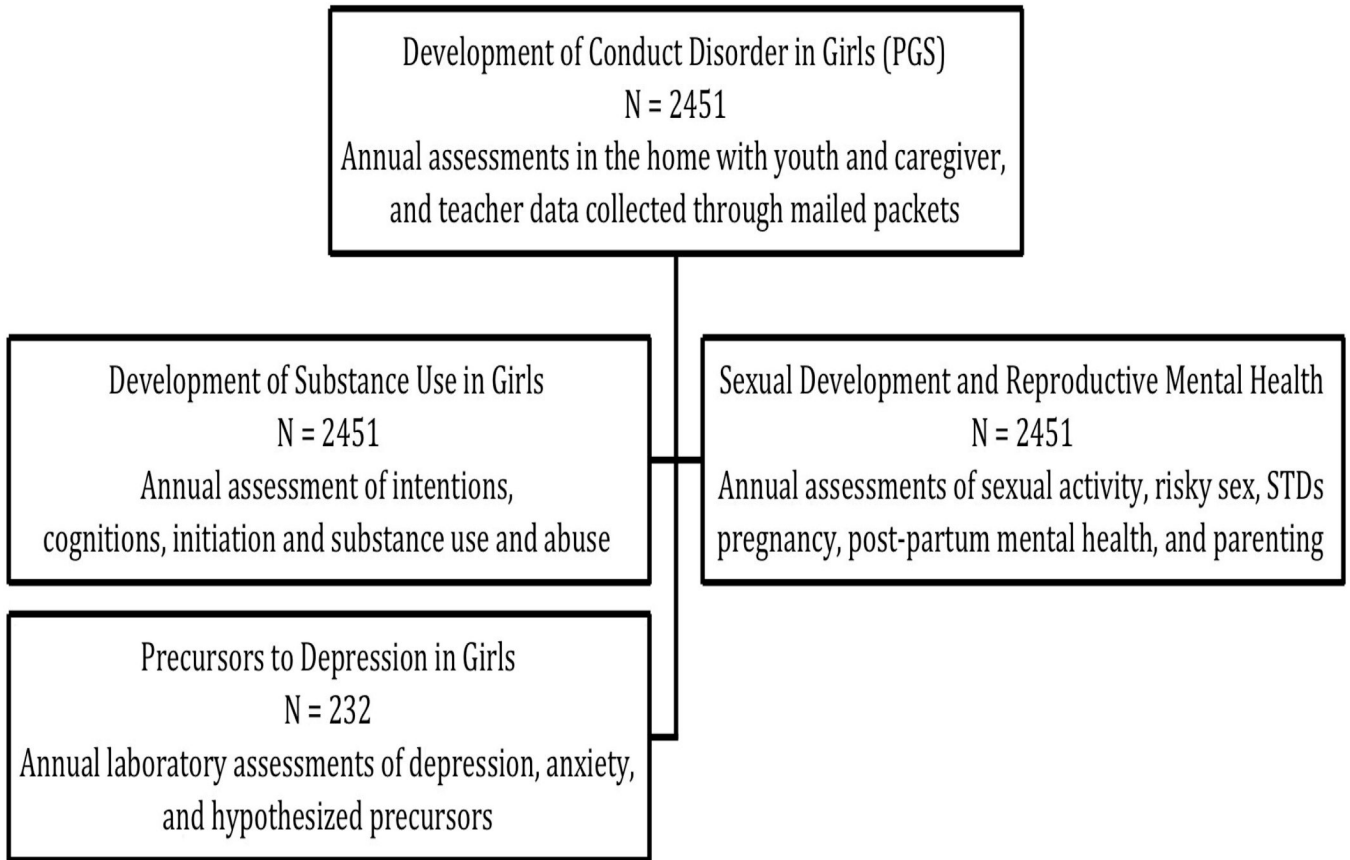


Figure 1.
Overview of Pittsburgh Girls Studies

Table 1

Demographic Characteristics of the Four Cohorts of the Pittsburgh Girls Study (n = 2451)

	5-year-olds (N = 588)		6-year-olds (N = 630)		7-year-olds (N = 611)		8-year-olds (N = 622)	
	N	%	N	%	N	%	N	%
<u>Child Race[‡]</u>								
African American	299	50.9	341	54.1	319	52.2	325	52.3
European American	250	42.5	234	37.1	257	42.1	258	41.4
Mixed/multi-race	37	6.3	54	8.6	35	5.7	39	6.3
<u>Caregiver Informant</u>								
Female respondent	544	92.5	595	94.4	562	92.0	576	92.6
Biological parent	553	94.0	584	92.7	571	93.5	563	90.5
Married/co-residing	354	60.2	364	57.8	370	60.6	349	56.1
≤ 11 years of education	95	16.2	108	17.1	102	16.7	107	17.2
Receipt of public aid	242	41.2	260	41.3	247	40.4	203	32.6

Notes:

[‡] For three girls the race is unknown

Table 2

Domains assessed in the Pittsburgh Girls Study

Disruptive Behavior: ADHD/ODD/CD; relational aggression; callousness; delinquency; antisocial personality disorder
Substance Use nicotine, alcohol, and drug use; nicotine dependence, substance abuse/dependence; substance-related cognitions (e.g., attitudes toward use, expectancies regarding use, and subjective effects of substance use)
Other Disorders: depression; anxiety; bipolar disorder; PTSD; somatization; borderline personality disorder; eating disorders
Temperamental Dispositions: positive/negative affect; assertion, cooperation, and control; empathy; responsibility; rumination; sensation seeking
Personal Resources: religiosity; ethnic identity; academic achievement; cognitive ability
Trauma: sexual abuse; crime victim or witness, and racism
Peer Relations: peer relations, peer victimization, friendship quality
Physical Health: pubertal development; physical health, BMI, body image, sleep, physical and mental health service use
Sexual development: Sexual behavior; sexual orientation; gender roles; birth control use; pregnancy
Caregiving Environment: family relations; parental bond; caregiver/child conflict; caregiver/partner relations; caregiver mental health; life events and perceived stress
Neighborhood environment: social control; organization; demographic characteristics