

Published in final edited form as:

*Compr Psychiatry*. 2011 ; 52(4): 359–369. doi:10.1016/j.comppsy.2010.08.006.

## Parent-Reported Mental Health in Preschoolers: Findings Using a Diagnostic Interview

Sara J. Bufferd<sup>1,\*</sup>, Lea R. Dougherty<sup>2</sup>, Gabrielle A. Carlson<sup>3</sup>, and Daniel N. Klein<sup>1,3</sup>

<sup>1</sup>Department of Psychology, Stony Brook University, Stony Brook, NY, USA

<sup>2</sup>Department of Psychology, University of Maryland, College Park, MD, USA

<sup>3</sup>Department of Psychiatry, Stony Brook University School of Medicine, Stony Brook, NY, USA

### Abstract

Previous research suggests that many preschoolers meet criteria for psychiatric diagnoses; still, relatively little is known about preschool mental health, particularly emotional problems, in the community. The present study investigates the rates of parent-reported DSM-IV disorders in a large community sample of preschoolers using the Preschool Age Psychiatric Assessment (PAPA). 541 parents were interviewed with the PAPA. Of the children, 27.4% met criteria for a PAPA/DSM-IV diagnosis; 9.2% met criteria for two or more diagnoses. Oppositional defiant disorder (ODD) (9.4%), specific phobia (9.1%), and separation anxiety disorder (5.4%) were the most common diagnoses; depression (1.8%), selective mutism (1.5%), and panic disorder (0.2%) were least common. In addition, there was significant comorbidity/covariation between depression, anxiety, and ODD, and between ODD and attention deficit hyperactivity disorder (odds ratios: 1.81-18.44;  $p < .05$ ). The stability and clinical significance of diagnoses and patterns of comorbidity must be elucidated in future research.

### 1. Introduction

In recent years, there has been a growing interest in the mental health of preschool-aged children [1-7]. Expanding the knowledge base in this area is important for at least four reasons. First, several studies have suggested that emotional and behavioral disorders among preschoolers are fairly common; indeed, the prevalence of psychiatric disorders in preschoolers may be similar to school-age children [8,9]. Second, a small group of studies indicates that symptoms in preschoolers are relatively stable, and are not merely transient phenomena [10]. For example, Lavigne et al. [11] found moderate stability across disorders over four years, and 58% of the children with a disorder in preschool continued to meet criteria 2 to 5 years later.

Third, disorders occurring during the preschool years may have negative implications for children's development. The preschool period is associated with a number of challenges, such as the development of peer relations and entrance into formal school programs. Thus,

© 2010 Elsevier Inc. All rights reserved.

\*Corresponding author. Stony Brook University, Department of Psychology, Stony Brook, NY 11794-2500, USA, Tel.: +1 631 632 7838; fax: +1 631 632 7915. Sara.Bufferd@stonybrook.edu (S.J. Bufferd).

The authors have no conflicts of interest to disclose.

**Publisher's Disclaimer:** This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

emotional and behavioral problems at this age can have a significant impact on children's subsequent development. The identification of problems that surface early in life is critical for minimizing their potential long-term effects [12].

Finally, the documentation of diagnosable disorders may encourage the development of better prevention and early intervention programs [13,14]. This is important, as research on children with significant psychopathology indicates that intervention prior to school entry can be more effective than later treatment [15], and produce long-term treatment gains [16].

However, the preschool period poses unique challenges to assessment. It is associated with extensive and rapid changes in language, cognition, emotion, and social behavior that can influence symptom manifestations in ways that are poorly understood [8]. For example, the onset of increasingly autonomous behavior in preschoolers complicates the assessment of oppositional symptoms such as defiance and rule breaking. As with school-age children and adolescents, clinically significant symptoms and disorders must be differentiated from normative behaviors [5,12]. Unfortunately, there are few data to guide the application of current diagnostic criteria in an age-appropriate fashion [17,18].

The development of checklist measures to assess both broad [19] and specific symptom domains [e.g., 20] in young children provided the foundation for the growing field of preschool psychopathology. Using parent and teacher rating scales, researchers have reported important data on the levels, correlates, and stability of symptoms in preschoolers in cross-sectional [e.g., 20-25] and longitudinal [e.g., 26-32] studies. This work has informed recent efforts to modify diagnostic criteria for preschoolers [33], apply principles of developmental science to distinguish normative from non-normative behavior [34], and develop structured diagnostic interviews to assess psychopathology in young children [7,35-37].

Most of the research on the prevalence and comorbidity of preschool psychopathology has focused on a specific set of symptoms or disorders, with a particular emphasis on externalizing problems. However, several research groups have assessed a broad range of psychiatric disorders in samples of preschoolers [3,6,7,9,37-40]. In studies of non-specialty-referred preschoolers, rates of diagnoses across categories ranged from 14.0-26.4% [3,38-40]. Rates of behavioral disorders ranged from 2.0-16.8%, and rates of emotional disorders ranged from 0.5-14.9%. To the extent that preschool researchers have examined demographic correlates in relation to specific disorders, few associations have been found with the exception that boys were more likely to be diagnosed with attention-deficit/hyperactivity disorder than girls [3,8].

As this area of work is still in an early stage, most of these studies used relatively small samples. Subjects were recruited from a variety of settings, including child psychiatry clinics [6,37], primary care clinics [8,9] social service agencies [40] and combinations of settings (clinical referrals and advertising [7]; primary care clinics and preschools: [3]). Only one study used an unselected community sample [38], but this study included only 100 children. Moreover, only two studies, both from the same group, included more than 350 subjects [3,9].

Lavigne et al. [3] recently reported the largest study to date ( $N = 796$ ). In addition to its size, an important strength was the use of an ethnically diverse sample. However, this study used a respondent-based interview, which did not permit clarification of symptoms with parents. Although respondent-based interviews are widely used in epidemiological research, they may have limitations when assessing behaviors that are very common in young children (e.g., temper tantrums, fears). Interviews that allow for the clarification of questions and responses, and elicit concrete examples of potential symptoms may be more likely to ensure

accurate interpretation of questions and distinguish clinically significant symptoms from normal-range variations in young children's behavior. In addition, the only internalizing disorders assessed in the study were major depression, dysthymia, and generalized anxiety disorder. Given the paucity of data on rates of internalizing disorders in young children, it is important to assess other anxiety disorders that may be common in preschoolers (e.g., specific phobia, social phobia, separation anxiety disorder).

In addition, with two exceptions [3,38] existing studies included children across a range of ages (primarily ages 2 through 5). Keenan et al.'s [40] sample included a narrower age range (4.6-5.8 years) than other studies, but did not include children from earlier in the preschool period. Given suggestions of age differences in the rates of some disorders in preschoolers [8], it may be useful to examine narrower age bands in order to obtain a clearer picture of psychopathology during this period of rapid developmental change. Thus, there continues to be a need for additional studies assessing a broad range of emotional and behavioral disorders in community samples of preschool-aged children.

The primary goal of this study is to build on previous research and extend our understanding of mental health in preschoolers by investigating a range of parent-reported emotional and behavioral disorders in a community sample of early preschoolers using the Preschool Age Psychiatric Assessment (PAPA [35]). Specifically, this paper will examine: (1) demographic correlates of mental health; (2) the proportion of children meeting criteria for 11 *Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> edition, Text Revision* (DSM-IV [41]) diagnoses; (3) comorbidity between diagnoses; and (4) associations with several indices of psychosocial functioning. In addition, given the potential value of using symptom dimensions [42], we will conduct a series of parallel analyses using dimensional symptom scales scores derived from the PAPA to confirm the categorical-level findings on comorbidity and associations with psychosocial functioning.

## 2. Method

### 2.1 Participants

Families with a 3-year-old child living within 20 contiguous miles of Stony Brook, NY with at least one biological parent were eligible to participate. The primary caregiver was required to speak English, and children with significant medical disorders or developmental disabilities were excluded. Of the 815 families who were identified as eligible, 66.4% entered the study and provided diagnostic information about the child. There were no significant differences between families who did and did not participate on child sex and race/ethnicity, and parental marital status, education, and employment status. Informed, voluntary, and written consent was obtained from the parent prior to participation. The study was approved by the human subjects review committee at Stony Brook University and families were compensated.

In order to recruit a sufficient number of families in a cost-effective manner, we used commercial mailing lists. Mailing lists were provided by Survey Sampling International who utilize over 3,200 public, private, and non-profit sources (e.g., hospital records, baby store mailing lists, birth class registrations) to generate potential participants with an 85% coverage rate. Compared to other sampling methods such as random digit dialing (RDD), commercial mailing lists are more cost-effective in targeting a small subgroup of the population. Further, there appear to be no significant differences in demographic and health-related variables between samples obtained using RDD and commercial databases [43].

Five hundred forty-one parents were interviewed regarding their 3-year-old child. Data collection occurred from November 2004 through July 2007. Only one child per family was

assessed. Table 1 lists the demographic information for the study sample. The median household income fell into the \$70,000-\$90,000 category. To provide a context, the living wage (i.e., the minimum wage necessary to support a family) for a family with 2 adults and 2 children in Suffolk County is \$72,194 (<http://www.livingwage.geog.psu.edu/>). Approximately a third of the sample had a family income beneath the living wage. Census data suggest the sample is reasonably representative of the surrounding county (population = 1,453,229), where 87.3% of parents with children below age 18 were married; 79.0% of individuals were White/non-Hispanic; the median income for householders aged 25-44 was \$75,000-\$99,999; and 48.1% of adults aged 25-54 graduated from college.

## 2.2 Measures

**Preschool Age Psychiatric Assessment (PAPA; Version 1.4)**—The PAPA is the first published diagnostic interview to assess parent-reported psychiatric disorders in preschoolers between the ages of 2 and 5 [35,44]. It uses a structured format and an interviewer-based approach. The interviewer must adhere to the protocol and ask all required questions, but must also confirm the parent's understanding of the question, elicit examples of relevant behaviors, and apply a priori guidelines for rating symptoms using a glossary. Symptoms occurring 3 months prior to the interview are rated to maximize accuracy of recall, but initial onset dates are elicited even when they precede the 3-month primary period to assess the duration of symptoms. Adequate test-retest reliability has been reported using independent interviews [39].

The PAPA covers a comprehensive set of symptoms from the DSM-IV [41] as well as their effects on the child's relationships with parents, siblings, and peers, and functioning at school and activities. In addition, the parent was asked whether the child and/or family had received mental health treatment in relation to the child's symptoms; 2.2% of the respondents ( $n = 12$ ) reported receiving mental health treatment for their child's symptoms.

DSM-IV diagnoses are derived using algorithms created by the instrument's developers. Emotional disorders included any depressive (major depressive disorder, dysthymia, or depression not otherwise specified [NOS]) or anxiety (specific phobia, separation anxiety, social phobia, generalized anxiety disorder, agoraphobia, selective mutism, and panic disorder) disorder; behavioral disorders included attention-deficit/hyperactivity disorder (ADHD) or oppositional defiant disorder (ODD). Bipolar disorder, conduct disorder, eating disorders, posttraumatic stress disorder, and obsessive-compulsive disorder were not assessed because they are very rare at age 3 [4,39] although some of these conditions may be more common in older preschool-aged children [e.g., 45,46]. Dimensional symptom scales were created by summing items in each diagnostic category. As expected, symptom scale scores were not normally distributed. However, given that the disorders would not be expected to be normally distributed, we did not transform these variables.

Following Egger et al. [39], to operationalize terms such as “often,” “excessive,” and “persistent,” in the DSM-IV criteria for the algorithms for separation anxiety disorder (SAD) and ODD, we selected as a cutoff the frequency that identified the top 10% of the distribution of children in the sample. This ensures that any child meeting criteria exhibits these developmentally typical behaviors more frequently than other children.

Interviews were conducted by advanced graduate students in clinical psychology who received training on the administration of the PAPA from a member of the PAPA group. Interviews were generally conducted by telephone, and usually lasted about one hour. To examine interrater reliability, a second rater from the pool of interviewers independently rated audiotapes of 21 PAPA interviews. The interviews were randomly selected, but we over-sampled participants who reported mental health problems. ICCs for the symptom

scales were: depression (.85), anxiety (1.00), ADHD (.99), and ODD (.99). Kappas were 1.00 for all diagnostic categories. Internal consistency ( $\alpha$ ) of the symptom scales was: depression (.75), anxiety (.83), ADHD (.89) and ODD (.84).

**Early Childhood Inventory-4 (ECI-4)**—The ECI-4 is a parent rating scale used to screen DSM-IV emotional and behavioral disorders in 3- to 6-year-olds [47]. Parents completed the ADHD and ODD sections of the inventory. The correct classification rates for ADHD and ODD with respect to chart diagnoses were 60% and 74%, respectively [48]. In the present sample, coefficient alphas for the ECI-4 were .79 (ADHD-Inattention), .82 (ADHD-Hyperactivity/Impulsivity), and .85 (ODD).

Due to concerns about administration time, in the first 60% of the sample ( $n = 324$ ) the interviewer used the ECI-4 ADHD and ODD scales as a screen to help determine whether to complete the ADHD and ODD sections of the PAPA. If evidence from the screener indicated the child was very unlikely to meet diagnostic criteria, the interviewer briefly confirmed the absence of ADHD and ODD with the parent. If the parent continued to report that there was no evidence of ADHD and/or ODD, this section(s) of the interview was skipped. In the remaining 40% of the sample ( $n = 217$ ), the PAPA ADHD and ODD sections were administered to all parents. ADHD and ODD dimensional scores were estimated for children for whom these sections were skipped using ECI-4 ADHD and ODD scores and maximum likelihood estimation procedures for missing values [49]. This is less biased than pairwise and listwise deletion procedures, even with large amounts of missing data [50]. However, all results were similar when analyses were limited to the 40% of the sample who received the complete PAPA ADHD and ODD sections.

**Children's Global Assessment Scale (CGAS)**—The CGAS is a global measure of children's level of functioning [51]. Scores range from 0-100, where 0 indicates the worst functioning and 100 indicates superior functioning. The mean CGAS score in this sample was 84.2 ( $SD = 14.2$ ). The PAPA interviewer completed the CGAS, and interrater reliability (ICC) for the ratings was .92.

**Vineland Adaptive Behavior Screener Socialization subscale**—Prior to the PAPA, the Vineland Adaptive Behavior Screener Socialization subscale was administered to the parent [52]. The Socialization subscale contains 15 items designed to assess developmentally relevant interpersonal interactions, play, sensitivity, manners, and responsibility. Items are scored on a 3-point scale, with lower scores indicating poorer functioning. The mean Vineland score was 18.9 ( $SD = 3.7$ ). In this sample, coefficient alpha was found to be relatively low (.52). Interrater reliability (ICC) for the Vineland was .81. The correlation between the Vineland and CGAS ratings was .26 ( $p < .001$ ).

### 2.3 Statistical Analyses

The PAPA algorithms were used to derive rates of parent-reported disorders. Depression NOS was included in the “any depression” category due to the small number of cases of major depression/dysthymia. Ninety-five percent confidence intervals (CIs) were computed using an online CI calculator. Chi-squared tests were used to examine the associations between demographic variables and PAPA diagnoses, and the relation between comorbidity and mental health treatment. Pearson correlations were computed to examine covariation between symptom dimensions and psychosocial functioning. *T*-tests were used to examine the associations between demographic variables and PAPA symptoms, and the bivariate associations between disorders and psychosocial functioning (CGAS and Vineland). One-way analyses of variance (ANOVAs) were used to examine the relation between comorbidity and psychosocial functioning. Multiple regressions were used to examine

unique associations of each disorder (IVs) on psychosocial functioning (DVs), and the unique association between symptom scales and psychosocial functioning. Logistic regressions were conducted to examine the bivariate and unique associations between diagnoses and mental health treatment, and were also conducted to examine the associations between diagnoses (adjusted and unadjusted Odds Ratios (ORs) are presented along with 95% CIs). We calculated whether comorbidity occurred at rates above chance based on a procedure outlined by Caron and Rutter [53]. The ratio of observed frequency (O) of comorbidity between each diagnostic pair to the frequency expected by chance (E, calculated as disorder 1 rate  $\times$  disorder 2 rate) was determined for each set of comorbid diagnoses with a significant OR. If the 95% CI for the ratio did not include zero, the comorbidity rate exceeds chance. Data were analyzed using SPSS Version 14.0 and alpha was set at .05.

### 3. Results

#### 3.1 Associations with demographic variables

Diagnoses were not associated with the demographic variables presented above (children's age, sex, race/ethnicity, and parents' age, marital status, income, and education), with three exceptions: children with SAD ( $n = 29/538$ ) had younger fathers ( $M = 36.0$  years,  $SD = 6.6$ ) than children without SAD ( $M = 38.4$  years,  $SD = 5.3$ ),  $t(536) = -2.35$ ,  $p < .05$ ; children with agoraphobia ( $n = 19/538$ ) had older fathers ( $M = 41.0$  years,  $SD = 6.5$ ) than children without agoraphobia ( $M = 38.2$  years,  $SD = 5.4$ ),  $t(536) = 2.18$ ,  $p < .05$ ; and children with specific phobia ( $n = 39/461$ ) came from families with lower incomes (with income scored on a 10-point scale, with  $>\$150,000$  representing the highest income category) ( $M = 6.8$ ,  $SD = 1.7$ ) than children without specific phobia ( $M = 7.4$ ,  $SD = 1.7$ ),  $t(459) = -2.09$ ,  $p < .05$  ( $n = 80$  families did not report their income). When all demographic variables were entered simultaneously as covariates, the results of all analyses in this paper were the same.

#### 3.2 Proportion of children meeting criteria for DSM-IV diagnoses

Table 2 shows the current rates of parent-reported psychiatric disorders in the preschoolers in this sample across all levels of severity. Of the children, 27.4% (148/541) met criteria for at least one PAPA/DSM-IV diagnosis. ODD, specific phobia, and SAD were the most common disorders in this sample; depression, selective mutism, and panic disorder were the least prevalent. Specific phobia is arguably less impairing and more transient than other disorders; excluding specific phobia, the overall rate of disorders was 22.5% (122/541).

As noted above, we used the ECI screener for ADHD and ODD for the first 60% of the sample. The rates for ADHD and ODD were fairly comparable for the first 60% (ADHD = 2.5%, ODD = 9.3%) and latter 40% (ADHD = 1.4%, ODD = 9.7%) of the sample. In addition, the chi-squares comparing the rates in the first and second parts of the sample did not approach significance (both  $ps > .80$ ).

#### 3.3 Comorbidity between diagnoses

Of the children, 9.2% (50/541) met criteria for two or more diagnoses; 33.8% (50/148) of those with at least one diagnosis met criteria for multiple diagnoses. Logistic regressions were conducted to examine the associations between diagnoses. Table 3 shows the odds ratios (ORs) for each combination of the four main diagnostic categories: depression, anxiety, ADHD, and ODD. There was significant comorbidity between depression, anxiety, and ODD, and between ODD and ADHD. We also conducted the analyses controlling for all other diagnoses in order to examine whether the associations were accounted for by comorbidity with another diagnosis [54]. In most cases, controlling for other diagnoses slightly weakened, but did not eliminate the comorbid associations (see Table 3).

The rate of comorbidity was significantly higher than expected by chance between each pair of diagnoses with significant ORs (depression and anxiety, O/E = 2.75, CI = .55-4.95; depression and ODD, O/E = 3.5, CI = .07-6.93; anxiety and ODD, O/E = 1.67, CI = .85-2.49; ADHD and ODD, O/E = 6.5, CI = 1.7-11.3).

We also examined comorbidity for each of the specific anxiety disorders using logistic regressions. The results presented here reflect associations while controlling for all other diagnoses (the results when other disorders are not controlled are available upon request). In the multivariate analyses, panic disorder and selective mutism were excluded as covariates because of the low *ns* ( $n = 1$  and  $n = 8$ , respectively). Significant associations were observed between specific phobia and depression (OR = 4.52,  $p < .05$ , CI = 1.01-20.18) and separation anxiety (OR = 4.22,  $p < .01$ , CI = 1.68-10.98); separation anxiety and GAD (OR = 8.46, CI = 2.88-24.88,  $p < .001$ ); and social phobia and agoraphobia (OR = 13.33, CI = 4.00-44.40,  $p < .001$ ).

### 3.4 Associations between disorders and psychosocial functioning

All diagnoses were significantly associated with poorer psychosocial functioning on the CGAS and Vineland, with the exception of a non-significant association between any anxiety disorder and the Vineland (Table 4). ODD exhibited the highest associations with both psychosocial functioning measures. When the four diagnostic categories were entered simultaneously as independent variables (IVs) in a multiple regression with CGAS scores as the dependent variable (DV), all diagnoses remained significantly associated with the CGAS: depression ( $\beta = -.09$ ,  $t(540) = -2.44$ ,  $p < .05$ ), anxiety ( $\beta = -.32$ ,  $t(540) = -8.97$ ,  $p < .001$ ), ADHD ( $\beta = -.13$ ,  $t(540) = -3.62$ ,  $p < .001$ ), and ODD ( $\beta = -.38$ ,  $t(540) = -10.25$ ,  $p < .001$ ). When the three diagnoses with significant bivariate associations with the Vineland (depression, ODD, ADHD) were entered simultaneously as IVs in a multiple regression model, only ODD remained significantly associated with the Vineland,  $\beta = -.19$ ,  $t(540) = -4.28$ ,  $p < .001$ .

Twelve children (2.2%) received mental health treatment, 9 (75%) of whom met criteria for at least one PAPA diagnosis. Logistic regressions were conducted to examine the association between diagnoses and mental health treatment. ODD and ADHD were significantly associated with treatment (OR = 7.52, CI = 2.29-24.67,  $p < .01$  and OR = 21.29, CI = 4.83-93.68,  $p < .001$ , respectively). When ODD and ADHD were entered simultaneously as IVs, both diagnoses continued to be associated with treatment (OR = 4.37, CI = 1.11-17.27,  $p < .05$  and OR = 9.37, CI = 1.72-51.06,  $p < .05$ , respectively).

Finally, we examined the association between comorbidity and psychosocial functioning and treatment. A one-way analysis of variance comparing functioning scores between children with no diagnosis, one diagnosis, and two or more diagnoses revealed significant differences on the CGAS ( $F(2, 538) = 135.1$ ,  $p < .001$ ) and the Vineland Socialization scale ( $F(2, 537) = 5.0$ ,  $p < .01$ ) (Table 5). A post-hoc Scheffé test revealed significant differences between each of the three diagnostic groups on CGAS scores, and a significant difference between children with no diagnosis and children with two or more diagnoses on the Vineland. Children with one ( $n = 5/98$ ) or two or more ( $n = 4/50$ ) diagnoses were also more likely to have received treatment than children with no diagnosis ( $n = 3/393$ ),  $X^2(1, N = 483) = 9.28$ ,  $p < .01$  and  $X^2(1, N = 435) = 15.41$ ,  $p < .001$ , respectively; children with one versus two or more diagnoses did not differ on probability of treatment,  $X^2(1, N = 144) = .53$ , *ns*.

### 3.5 Analyses using dimensional symptom scales

**3.5.1 Covariation between symptom dimensions**—The covariation of parent-reported symptoms was also examined using dimensional scores (see Table 6). The pattern

of associations was generally similar to the pattern of comorbidity found for diagnoses: there were significant correlations between depression, anxiety, and ODD, and between ADHD and ODD. Similar to the analyses of comorbid diagnoses, controlling for other dimensional scores slightly weakened but did not eliminate the associations.

### 3.5.2 Associations between symptom dimensions and psychosocial functioning

—Each of the PAPA symptom scales was significantly associated with worse psychosocial functioning on the CGAS and Vineland (see Table 6). ADHD and ODD exhibited the highest, and depression and anxiety the lowest, associations with both psychosocial functioning measures. In addition, symptoms of depression, ADHD, and ODD were significantly associated with treatment. When all 4 symptom scales were entered simultaneously as independent variables (IVs) in a multiple regression with CGAS scores as the dependent variable (DV), all were independently associated with CGAS scores, depression ( $\beta = -.12$ ,  $t[540] = -3.48$ ,  $p < .01$ ), anxiety ( $\beta = -.36$ ,  $t[540] = -10.77$ ,  $p < .001$ ), ADHD ( $\beta = -.23$ ,  $t[540] = -6.80$ ,  $p < .001$ ), and ODD ( $\beta = -.33$ ,  $t[540] = -9.15$ ,  $p < .001$ ). Using the Vineland as the DV, each of the symptom scales except depression contributed significant unique variance (anxiety ( $\beta = -.14$ ,  $t[539] = -3.05$ ,  $p < .01$ ), ADHD ( $\beta = -.20$ ,  $t[539] = -4.36$ ,  $p < .001$ ), ODD ( $\beta = -.17$ ,  $t[539] = -3.41$ ,  $p < .01$ ). When treatment was regressed on the three symptom scales with significant bivariate correlations in a simultaneous logistic regression model, the ADHD (OR = 1.11, CI = 1.04-1.18,  $p < .01$ ) and ODD (OR = 1.10, CI = 1.00-1.22,  $p = .05$ ) scales exhibited unique associations, whereas the depression scale was not independently associated with treatment.

## 4. Discussion

This study complements the existing research examining mental health problems in young children. It is only the fourth study [3,39,40] to examine rates of parent-reported DSM disorders in non-specialty clinic referred preschoolers using a comprehensive diagnostic interview, and includes a larger number of children than all studies except Lavigne et al. [3].

We found that a substantial number of children (27.4%) met standard PAPA/DSM-IV criteria within the past 3 months. ODD, specific phobia, and SAD were the most prevalent disorders; depression, selective mutism, and panic disorder were the least prevalent. Although it is difficult to compare rates of disorders across studies with varying methods, the rates of specific disorders in this study were consistent with, although at the higher end of the range of, previous studies with samples of non-specialty clinic referred preschoolers (see Table 2) [3,9,38-40]. However, we assessed a greater number of emotional disorders than other studies, hence it is not surprising that higher rates were observed for any emotional disorder and any diagnosis. The rate of ADHD (2.0%) was consistent with, although at the lower end of the range of, previous studies (2.0-12.8%). It is possible that the inclusion of older preschool-aged children in other samples accounts for this difference as symptoms of ADHD may be easier to recognize as children are required to function in a greater number of, and more demanding, contexts.

It is noteworthy that ODD, specific phobia, and SAD had the highest rates, as some degree of fear and oppositional behavior are normative during the preschool period. Following Egger et al. [39], we attempted to address this issue by counting ODD and SAD symptoms for the diagnosis only if they fell in the top 10% of the distribution on frequency of occurrence. However, the 10% cutoff is admittedly arbitrary. When we applied a 5% cutoff, the rate of ODD dropped substantially, going from 9.4% to 4.1%. In contrast, the change in the rate of SAD was much smaller, decreasing from 5.4% to 4.6%. Hence, the effect of changing cutoffs varies for different disorders. Further work is needed to establish empirically-based cutoffs.



Similar to older youth and adults, there was considerable overlap between disorders: 9.2% of children met criteria for two or more diagnoses. This falls at the high end of the range in other studies (5.4-8.0% [3,9,39]). As noted above, this likely reflects the greater number of disorders assessed in this study. We examined the associations between the four major classes of disorders at both the diagnostic and the symptom dimension level. In both sets of analyses, there was significant comorbidity/covariation between depression, anxiety, and ODD, and between ODD and ADHD. However, ADHD was associated with depression only in the dimensional analysis, and was not associated with anxiety at either the diagnostic or dimensional level. The magnitudes of the associations decreased somewhat after controlling for comorbidity with other disorders, but the pattern remained similar.

Consistent with other studies of preschoolers, there was considerable overlap between emotional and behavior disorders [7,9,40]. We are aware of only one similar study that reported rates of comorbidity among specific disorders [3]. They also found the highest degree of comorbidity between ODD and ADHD. Unlike our study, they found an association between ADHD and depression diagnoses; however, they assessed very few internalizing disorders, so other patterns of comorbidity cannot be compared. Consistent with studies of older children [54] the magnitudes of the associations between disorders in this study were the largest between ADHD and ODD, then depression and anxiety, and then depression and ODD. The association was the lowest between ADHD and anxiety. In addition, the magnitude of the relation between depression and anxiety was very similar to that between depression and ODD, which has been found in older children as well [54]. The association found between depression and anxiety suggests that this comorbidity that is identified regularly in adults [e.g., 55] is evident as early as the preschool period.

The finding that ODD was comorbid with all of the other major groups of disorders examined in the study (with the exception of anxiety disorders when controlling for other diagnoses) is consistent with previous research with preschool-aged children [8], and with longitudinal studies finding that oppositionality is an antecedent of virtually all forms of psychopathology in preschoolers [11] and adolescents and adults [56,57]. These findings might be explained by recent research in older children indicating that ODD includes several distinct components that have more specific associations with other disorders both cross-sectionally [58] and longitudinally [59,60]. Thus, ODD appears to include an irritability dimension that is associated with some emotional disorders, a headstrong dimension that is associated with ADHD, and a hurtful dimension that is associated with both ADHD and conduct disorder [59].

PAPA diagnoses and symptom scores were associated with psychosocial functioning on the CGAS and Vineland Socialization scale, as well as with mental health treatment. Overall, ODD and ADHD had the largest associations with each functioning measure. These results are consistent with previous findings that 5-year-olds with externalizing psychopathology were more likely to be rated as impaired than children with internalizing psychopathology [40]. Also consistent with studies of preschoolers [39], older youth [54], and adults [55], children with multiple disorders exhibited poorer psychosocial functioning on the CGAS than children with a single disorder.

With a few exceptions, diagnoses were not associated with demographic variables. Studies with older children [e.g., 61] and those using checklist measures in preschoolers [10,21] suggest that demographic variables such as minority status, male sex, and lower socioeconomic status are associated with emotional and behavioral problems in children, but few preschool researchers have examined these correlates in relation to specific disorders. Researchers have reported that preschool-aged boys are more likely to be diagnosed with ADHD than girls [3,8]. In the present study, more boys ( $n = 8/11$ ) met criteria for ADHD

than girls ( $n = 3/11$ ), but this difference was not statistically significant,  $X^2(1, N = 541) = 1.53, p = .22$ . Other demographic correlates such as race and age do not appear to be associated with diagnoses in preschoolers [3,39], but the research is fairly limited.

This study builds on other recent studies suggesting that the DSM-IV criteria can be applied to young children [e.g., 3,7,13,39]. However, a number of issues require further consideration. First, as noted above, many symptoms are similar to normative behaviors, and there is currently no consensus about how to make this distinction [8]. For example, the rate of ODD in this study was higher than in studies of school-age children [61,62]. In addition, there is evidence that many young children “outgrow” their fears with age [63]. Thus, some of the children in our sample who qualified for diagnoses of ODD, specific phobia, and SAD may be exhibiting transient problems that, despite being associated with impairment, could arguably be considered to fall at the high end of the normative range for this age. If so, it may suggest that current diagnostic criteria require modification for preschoolers. Longitudinal studies are needed to determine whether DSM-IV diagnoses in early childhood remain stable through subsequent developmental periods, remit completely, or persist at a subthreshold level, possibly conferring risk for later escalation to full-threshold disorders.

Second, the concept of psychosocial functioning can be problematic in preschoolers. Three-year-olds have relatively few activities and relationships in which to exhibit poor functioning. Moreover, parents vary in their tolerance of, and response to, problem behavior, which can influence both the reporting and level of psychosocial functioning.

Finally, many internalizing disorder symptoms reflect subjective states (e.g., sadness, worry). As many preschoolers cannot articulate these feelings, assessments must rely on adults’ inferences.

#### 4.1 Strengths and Limitations

This study has several significant strengths. This is one of very few studies to examine rates of DSM-IV disorders in a large community sample of preschoolers. In addition, we used a comprehensive, interviewer-based diagnostic interview that was specifically designed to assess emotional and behavioral disorders in preschool-aged children.

However, this study has also had a number of limitations. First, our data were based on parents’ reports, and did not incorporate data from other informants or direct observations of the child. In addition, the same source was used to assess both child disorders and psychosocial functioning, hence these associations may be inflated due to shared method variance.

Second, the correspondence between PAPA diagnostic thresholds and clinical judgments of caseness are unclear. While this is a general issue in psychiatric epidemiology, it may be even greater for preschool emotional and behavioral disorders where understanding and conventions regarding diagnostic criteria and boundaries are less developed.

Third, we focused on a narrow age group within the preschool period (three-year olds). While this provides more reliable estimates of rates of disorders in this age band, further work is needed to determine whether these rates differ at ages four and five.

Fourth, interviews were conducted by telephone, which has, to our knowledge, never been done with the PAPA before. However, in epidemiological studies of adult psychopathology, telephone interviews are common, and concordance between telephone and face-to-face interviews is high [64,65].

Fifth, we used the ECI screener for ADHD and ODD to reduce administration time for the first 60% of the sample. However, given the interviewers' confirmation of all negative ECI screeners, the false negative rate was probably quite low. In addition, the rates for ADHD and ODD were fairly comparable for the first 60% and latter 40% of the sample, and results were similar when analyses were limited to the subsample that received the complete PAPA ADHD and ODD sections. Nonetheless, the dimensional measures of ADHD and ODD must be regarded with caution.

Sixth, given the small number of cases of major depression/dysthymia, cases of depression NOS were included in the "any depression" category.

Seventh, interrater reliability was assessed using a small ( $n = 21$ ) number of interviews, and the use of audiotapes may produce high-end estimates. Eighth, many analyses were conducted, particularly with demographic variables, so it is possible that some of these results may be attributable to chance.

Ninth, the sample was not randomly ascertained, and the use of commercial mailing lists may introduce unknown biases. However, the demographic characteristics of the sample tended to mirror the community in which the study was conducted. Unfortunately, there is no economically feasible method to obtain representative samples of preschoolers in the United States. Thus, the best approach at this time may be to use a variety of recruitment procedures to triangulate on estimates of the rates of disorders in the community.

Finally, the sample was largely white and middle class, and the small number of children in racial/ethnic minority groups may limit the power to detect differences in rates of disorders and symptoms. Further work is needed to examine the rates of preschool emotional and behavioral problems in more diverse samples.

## 4.2 Conclusions and Implications for Research and Practice

When PAPA/DSM-IV criteria are applied to parent-reports of emotional and behavioral problems in preschoolers, rates of diagnoses and comorbidity appear to be relatively high, and symptoms are associated with poorer psychosocial functioning. These data are consistent with research on older youth. Although the meaning of these rates requires further elucidation, these findings suggest that parents, teachers, treatment providers in pediatric settings, and policy makers should be alert to the possibility that preschoolers may be experiencing clinically significant symptoms. Future research should include longitudinal studies to assess the stability of DSM disorders in young children as well as studies that incorporate multiple informants (e.g., both parents, teachers/child care providers) and measures (e.g., interviews, child observation). In addition, more normative data on preschoolers' behaviors are needed to discern the boundary between typical and problematic levels of symptoms [5,34].

## Acknowledgments

This research was supported by NIMH grant R01 MH069942 (Klein) and GCRC grant M01-RR10710 (Stony Brook University from the National Center for Research Resources). We would like to thank Evelyn Bromet for her very helpful feedback.

## References

1. Angold, A.; Egger, HL. Psychiatric diagnosis in preschool children. In: DelCarmen-Wiggins, R.; Carter, A., editors. *Handbook of Infant, Toddler, and Preschool Mental Health Assessment*. New York: Oxford University Press; 2004. p. 123-39.

2. Keenan K, Wakschlag LS, Danis B, Hill C, Humphries M, Duax J, et al. Further evidence of the reliability and validity of DSM-IV ODD and CD in preschool children. *J Am Acad Child Adolesc Psychiatry.* 2007; 46:457–68. [PubMed: 17420680]
3. Lavigne JV, LeBailly SA, Hopkins J, Gouze KR, Bins HJ. The prevalence of ADHD, ODD, Depression, and Anxiety in a community sample of 4-year-olds. *J Clin Child Adolesc Psychol.* 2009; 38:315–28. [PubMed: 19437293]
4. Luby, JL. *Handbook of preschool mental health: Development, disorders, and treatment.* New York, NY: The Guilford Press; 2006.
5. Wakschlag LS, Briggs-Gowan MJ, Carter AS, Hill C, Danis B, Keenan K, et al. A developmental framework for distinguishing disruptive behavior disorder from normative misbehavior in preschool children. *J Child Psychol Psychiatry.* 2007; 48:976–87. [PubMed: 17914998]
6. Wilens TE, Biederman J, Brown S, Monuteaux M, Prince J, Spencer TJ. Patterns of psychopathology and dysfunction in clinically referred preschoolers. *J Dev Behav Pediatr.* 2002; 23:S31–6. [PubMed: 11875288]
7. Birmaher B, Ehmann M, Axelson DA, Goldstein BI, Monk K, Kalas C, et al. Schedule for affective disorders and schizophrenia for school-age children (K-SADS-PL) for the assessment of preschool children – A preliminary psychometric study. *J Psychiatr Res.* 2009; 43:680–86. [PubMed: 19000625]
8. Egger HL, Angold A. Common emotional and behavioral disorders in preschool children: Presentation, nosology, and epidemiology. *J Child Psychol Psychiatry.* 2006; 47:313–37. [PubMed: 16492262]
9. Lavigne JV, Gibbons RD, Christoffel KK, Arend R, Rosenbaum D, Binns H, et al. Prevalence rates and correlates of psychiatric disorders among preschool children. *J Am Acad Child Adolesc Psychiatry.* 1996; 35:204–14. [PubMed: 8720630]
10. Campbell SB. Behavior problems in preschool-children: A review of recent research. *J Child Psychol Psychiatry.* 1995; 36:113–49. [PubMed: 7714027]
11. Lavigne JV, Arend R, Rosenbaum D, Binns HJ, Christoffel KK, Gibbons RD. Psychiatric disorders with onset in the preschool years: I. Stability of diagnoses. *J Am Acad Child Adolesc Psychiatry.* 1998; 37:1246–54. [PubMed: 9847496]
12. Carter AS, Briggs-Gowan MJ, Davis NO. Assessment of young children’s social-emotional development and psychopathology: Recent advances and recommendations for practice. *J Child Psychol Psychiatry.* 2004; 45:109–34. [PubMed: 14959805]
13. Luby JL, Heffelfinger AK, Mrakotsky C, Hessler MJ, Brown KM, Hildebrand T. Preschool major depressive disorder: Preliminary validation for developmentally modified DSM-IV criteria. *J Am Acad Child Adolesc Psychiatry.* 2002; 41:928–37. [PubMed: 12162628]
14. Mesman J, Koot HM. Early preschool predictors of preadolescent internalizing and externalizing DSM-IV diagnoses. *J Am Acad Child Adolesc Psychiatry.* 2001; 40:1029–36. [PubMed: 11556626]
15. Dawson, G.; Osterling, J. Early intervention in autism: Effectiveness and common elements of current approaches. In: Guralnick, MJ., editor. *The effectiveness of early intervention: Second generation of research.* Baltimore, MD: Paul Brookes Publishing Co; 1997. p. 307-26.
16. Webster-Stratton C, Hammond M. Treating children with early-onset conduct problems: A comparison of child and parent training interventions. *J Consult Clin Psychol.* 1997; 65:93–109. [PubMed: 9103739]
17. Postert C, Averbeck-Holocher M, Beyer T, Müller J, Furniss T. Five systems of psychiatric classification for preschool children: Do differences in validity, usefulness and reliability make for competitive or complimentary constellations? *Child Psychiatry Hum Dev.* 2009; 40:25–41. [PubMed: 18704679]
18. Sterba S, Egger HL, Angold A. Diagnostic specificity and nonspecificity in the dimensions of preschool psychopathology. *J Am Acad Child Adolesc Psychiatry.* 2007; 48:1005–13.
19. Achenbach, TM.; Rescorla, LA. *Manual for the ASEBA Preschool Forms and Profiles: An integrated system of multi-informant assessment.* Burlington, VT: University of Vermont Department of Psychiatry; 2000.

20. Spence SH, Rapee R, McDonald C, Ingam M. The structure of anxiety symptoms among preschoolers. *Behav Res Ther.* 2001; 39:1293–1316. [PubMed: 11686265]
21. Gadow KD, Sprafkin J, Nolan EE. DSM-IV symptoms in-community and clinic preschool children. *J Am Acad Child Adolesc Psychiatry.* 2001; 40:1383–92. [PubMed: 11765283]
22. Koot HM, Verhulst FC. Prevalence of problem behavior in Dutch children aged 2–3. *Acta Psychiatr Scand.* 1991; 83:1–37. [PubMed: 2011948]
23. Pavuluri MN, Luk SL, McGee R. Parent reported preschool attention deficit hyperactivity: Measurement and validity. *Eur Child Adolesc Psychiatry.* 1999; 8:126–13. [PubMed: 10435461]
24. Richman N, Stevenson JE, Graham PJ, Ridgely MS, Goldman HH, Talbott JAC. Prevalence of behaviour problems in 3-year-old children: An epidemiological study in a London Borough. *J Child Psychol Psychiatry.* 1974; 16:277–871. [PubMed: 1206050]
25. Thomas BH, Byrne C, Offord DR, Boyle MH. Prevalence of behavioral symptoms and the relationship of child, parent, and family variables in 4- and 5-year-olds: Results from the Ontario Child Health Study. *J Dev Behav Pediatr.* 1991; 12:177–84. [PubMed: 1869622]
26. Briggs-Gowan MJ, Carter AS, Bosson-Heenan J, Guyer AE, Horwitz SM. Are infant-toddler social-emotional and behavioral problems transient? *J Am Acad Child Adolesc Psychiatry.* 2006; 45:849–58. [PubMed: 16832322]
27. Campbell SB, Ewing LJ, Breaux AM, Szumowski EK. Parent-referred problem three-year olds: Follow-up at school entry. *J Child Psychol Psychiatry.* 1986; 27:473–88. [PubMed: 3745347]
28. Kashani JH, Holcomb WR, Orvaschel H. Depression and depressive symptoms in preschool children from the general population. *Am J Psychiatry.* 1986; 143:1138–43. [PubMed: 3752297]
29. Keenan K, Shaw D, Delliquadri E, Giovannelli J, Walsh BT. Evidence for the continuity of early problem behaviors: Application of a developmental model. *J Abnorm Child Psych.* 1998; 26:441–52.
30. McGee R, Partridge F, Williams S, Silva PA. A twelve-year follow-up of preschool hyperactive children. *J Am Acad Child Adolesc Psychiatry.* 1991; 30:224–32. [PubMed: 2016226]
31. Moffitt TE, Caspi A, Dickson N, Silva P, Stanton W. Childhood-onset versus adolescent-onset antisocial conduct problems in males: Natural history from ages 3 to 18 years. *Dev Psychopathol.* 1996; 8:399–424.
32. Owens EB, Shaw DS. Predicting growth curves of externalizing behavior across the preschool years. *J Abnorm Child Psych.* 2003; 31:515–90.
33. Task Force on Research Diagnostic Criteria: Infancy and Preschool. Research diagnostic criteria for infants and preschool children: The process and empirical support. *J Am Acad Child Adolesc Psychiatry.* 2003; 42:1504–12. [PubMed: 14627886]
34. Wakschlag LS, Tolani PH, Leventhal BL. Research Review: ‘Ain’t misbehavin’: Towards a developmentally-specified nosology for preschool disruptive behavior. *J Child Psychol Psychiatry.* 2010; 51:3–22. [PubMed: 19874427]
35. Egger, HL.; Angold, A. The Preschool Age Psychiatric Assessment (PAPA): A structured parent interview for diagnosing psychiatric disorders in preschool children. In: DelCarmen-Wiggins, R.; Carter, A., editors. *Handbook of Infant, Toddler, and Preschool Mental Assessment.* New York: Oxford University Press; 2004. p. 223-43.
36. Lucas, CP.; Fisher, P.; Luby, J. Young-child DISC-IV research draft: Diagnostic Interview Schedule for Children. New York, NY: Columbia University; 1998.
37. Scheeringa MS, Haslett N. The reliability and criterion validity of the Diagnostic Infant and Preschool Assessment: A new diagnostic instrument for young children. *Child Psychiatry Hum Dev.* 2010; 41:299–312. [PubMed: 20052532]
38. Earls F. Application of DSM-III in an epidemiological study of preschool children. *Am J Psychiatry.* 1982; 139:242–43. [PubMed: 7055303]
39. Egger HL, Erkanli A, Keeler G, Potts E, Walter BK, Angold A. Test-retest reliability of the Preschool Age Psychiatric Assessment (PAPA). *J Am Acad Child Adolesc Psychiatry.* 2006; 45:538–49. [PubMed: 16601400]
40. Keenan K, Shaw DS, Walsh B, Delliquadri E, Giovannelli J. DSM-III-R disorders in preschool children from low-income families. *J Am Acad Child Adolesc Psychiatry.* 1997; 36:620–27. [PubMed: 9136496]

41. American Psychiatric Association. Diagnostic and statistical manual of mental disorders: Fourth edition text revision. Washington, DC: American Psychiatric Press; 2000.
42. Helzer JE, Kraemer HC, Krueger RF. The feasibility and need for dimensional psychiatric diagnoses. *Psychol Med.* 2006; 36:1671–80. [PubMed: 16907995]
43. Olson SH, Mignone L, Harlap S. Selection of control groups by using a commercial database and random digit dialing. *Am J Epidemiol.* 2000; 152:585–92. [PubMed: 10997549]
44. Egger, HL.; Ascher, BH.; Angold, A. The Preschool Age Psychiatric Assessment: Version 1.1. Durham, NC: Center for Developmental Epidemiology, Department of Psychiatry and Behavioral Sciences, Duke University Medical Center; 1999.
45. Graham-Bermann SA, Howell K, Habarth J, Krishnan S, Loree A, Bermann EA. Toward assessing traumatic events and stress symptoms in preschool children from low-income families. *Am J Orthopsychiatry.* 2008; 78:220–28. [PubMed: 18954185]
46. Kim-Cohen J, Arseneault L, Caspi A, Tomas MP, Taylor A, Moffitt TE. Validity of DSM-IV conduct disorder in 4<sup>1/2</sup>-5-year-old children: A longitudinal epidemiological study. *Am J Psychiat.* 2005; 162:1108–17. [PubMed: 15930059]
47. Gadow, KD.; Sprafkin, J. Early Childhood Inventory - 4:Screening Manual. Stony Brook, NY: Checkmate Plus; 2000.
48. Sprafkin J, Volpe RJ, Gadow KD, Nolan EE, Kelly K. A DSM-IV-referenced screening instrument for preschool children: The Early Childhood Inventory-4. *J Am Acad Child Adolesc Psychiatry.* 2002; 41:604–12. [PubMed: 12014793]
49. Acock AC. Working with missing values. *J Marriage Fam.* 2005; 67:1012–28.
50. Pastor JBN. Methods for the analysis of explanatory linear regression models with missing data not at random. *Qual Quant.* 2003; 37:363–76.
51. Shaffer D, Gould MS, Brasic J, et al. A children's global assessment scale (CGAS). *Arch Gen Psychiatry.* 1983; 40:1228–31. [PubMed: 6639293]
52. Sparrow, SS.; Carter, AS.; Cicchetti, DV. Vineland Screener: Overview, reliability, validity, administration, and scoring. New Haven, CT: Yale University, Department of Psychology; 1987.
53. Caron C, Rutter M. Comorbidity in child psychopathology: Concepts, issues and research strategies. *J Child Psychol Psychiatry.* 1991; 32:1063–80. [PubMed: 1787137]
54. Angold A, Costello EJ, Erkanli A. Comorbidity. *J Child Psychol Psychiatry.* 1999; 40:57–87. [PubMed: 10102726]
55. Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry.* 2005; 62:617–27. [PubMed: 15939839]
56. Kim-Cohen J, Caspi A, Moffitt TE, Harrington HL, Milne BJ, Poulton R. Prior juvenile diagnoses in adults with mental disorder developmental follow-back of a prospective-longitudinal cohort. *Arch Gen Psychiatry.* 2003; 60:709–17. [PubMed: 12860775]
57. Nock MK, Kazdin AE, Hiripi E, Kessler RC. Lifetime prevalence, correlates, and persistence of oppositional defiant disorder: Results from the National Comorbidity Survey Replication. *J Child Psychol Psychiatry.* 2007; 48:703–13. [PubMed: 17593151]
58. Stringaris A, Goodman R. Three dimensions of oppositionality in youth. *J Child Psychol Psychiatry.* 2009; 50:216–23. [PubMed: 19166573]
59. Stringaris A, Goodman R. Longitudinal outcome of youth oppositionality: Irritable, headstrong, and hurtful behaviors have distinctive predictions. *J Am Acad Child Adolesc Psychiatry.* 2009; 48:404–12. [PubMed: 19318881]
60. Stringaris A, Cohen P, Pine DS, Leibenluft E. Adult outcomes of youth irritability: A 20-year prospective community-based study. *Am J Psychiatry.* 2009; 166:1048–54. [PubMed: 19570932]
61. Costello JE, Angold A, Burns BJ, Stangl DK, Tweed DL, Erkanli A, et al. The Great Smoky Mountains Study of Youth: Goals, design, methods, and the prevalence of DSM-III-R disorders. *Arch Gen Psychiatry.* 1996; 53:1129–36. [PubMed: 8956679]
62. Maughan B, Rowe R, Messer J, Goodman R, Meltzer H. Conduct disorder and oppositional defiant disorder in a national sample: Developmental epidemiology. *J Child Psychol Psychiatry.* 2004; 45:609–21. [PubMed: 15055379]

63. Gullone E. The development of normal fear: A century of research. *Clin Psychol Rev.* 2000; 20:429–51. [PubMed: 10832548]
64. Rohde P, Lewinsohn PM, Seeley JR. Comparability of telephone and face-to-face interviews in assessing axis I and II disorders. *Am J Psychiatry.* 1997; 154:1593–98. [PubMed: 9356570]
65. Sobin C, Weissman MM, Goldstein RB, Adams P, Wickramaratne P, Warner V, et al. Diagnostic interviewing for family studies – Comparing telephone and face-to-face methods for the diagnosis of lifetime psychiatric disorders. *Psychiatr Genet.* 1993; 3:227–33.

**Table 1**

## Demographic Characteristics of the Study Sample

<b>Demographic Variable</b>	
Child mean age: years (SD)	3.6 (0.3)
Mother mean age: years (SD)	35.9 (4.4)
Father mean age: years (SD)	38.3 (5.4)
Child sex: female % ( <i>n</i> )	45.7 (247)
Child race/ethnicity: % ( <i>n</i> )	
White/non-Hispanic	86.9 (470)
Hispanic	9.1 (49)
African-American	1.3 (7)
Asian	1.7 (9)
Other	1.1 (6)
Interview respondents: % ( <i>n</i> )	
Biological Mother	98.0 (530)
Biological Father	1.5 (8)
Both parents	0.2 (1)
Grandparent	0.4 (2)
Biological parents' marital status: % ( <i>n</i> )	
Married	94.8 (513)
Divorced, separated, or widowed	1.7 (9)
Never married	3.5 (19)
Family income: % ( <i>n</i> ) <sup>a</sup>	
<\$50,000	9.2 (50)
\$50,000 - \$69,000	16.8 (91)
\$70,000 - \$89,000	17.7 (96)
\$90,000-\$119,000	22.0 (119)
≥\$120,000	19.4 (105)
Parents' education: % graduated college ( <i>n</i> )	
Mothers	55.2 (294)
Fathers	46.9 (246)

<sup>a</sup>Note: 14.8% of the sample (*n* = 80) did not indicate their family income level.



**Table 2**

## Comparison of Rates Across Studies

Disorder	Rate (%) (n) (95% CI)	Rates in other studies <sup>a</sup> (%)
Any diagnosis	27.4 (148) (23.6-31.1)	14.0-26.4
Any Emotional Disorder	20.3 (110) (16.9-23.7)	10.5-14.9
Any Depression	1.8 (10) (0.7-2.9)	0.0-2.1
MDD/Dysthymia	0.4 (2) (-0.1-0.9)	
Depression NOS	1.5 (8) (0.5-2.5)	
Any Anxiety Disorder	19.6 (106) (16.3-22.9)	
Specific phobia	9.1 (49) (6.7-11.5)	0.0-11.5
Separation anxiety	5.4 (29) (3.5-7.3)	0.5-5.0
Social phobia	4.4 (24) (2.7-6.1)	2.0-4.6
GAD	3.9 (21) (2.3-5.5)	0.5-6.5
Agoraphobia	3.5 (19) (2.0-5.1)	
Selective mutism	1.5 (8) (0.5-2.5)	0.6
Panic disorder	0.2 (1) (-0.2-0.5)	
Any Behavioral Disorder	10.2 (55) (7.6-12.7)	9.0-14.9
ADHD	2.0 (11) (0.8-3.2)	2.0-12.8
ODD	9.4 (51) (6.9-11.9)	4.0-16.8
Two or more diagnoses	9.2 (50) (6.8-11.6)	5.4-9.8

Note. N = 541.

<sup>a</sup>3,38-40 MDD = Major depressive disorder; NOS = Not otherwise specified; GAD = Generalized anxiety disorder; ADHD = Attention-deficit/hyperactivity disorder; ODD = Oppositional defiant disorder.

**Table 3**  
 Logistic Regression Comorbidity Analyses with PAPA/DSM-IV diagnoses: Odds Ratios (95% Confidence Intervals)

	<b>Depression</b>	<b>Anxiety</b>	<b>ADHD</b>	<b>ODD</b>
Depression	--	5.43* (1.47-20.10)	1.74 (-.15-20.12)	4.94* (1.18-20.73)
Anxiety	6.47** (1.79-23.34)	--	.95 (.22-4.12)	1.81 (.92-3.58)
ADHD	5.79 (.67-50.13)	1.56 (.41-5.96)	--	18.44*** (5.05-67.33)
ODD	6.87** (1.87-25.19)	2.03* (1.08-3.83)	19.33*** (5.45-68.60)	--

\*  $p < .05$ ;

\*\*  $p < .01$ ;

\*\*\*  $p < .001$ ;

Note: Odds ratios to the right of the diagonal reflect analyses conducted controlling for all other diagnoses. Odds ratios to the left of the diagonal reflect the associations without controlling for other diagnoses. Depression = any PAPA Depression diagnosis; Anxiety = any PAPA Anxiety diagnosis; PAPA = Preschool Age Psychiatric Assessment; ADHD = Attention-Deficit/Hyperactivity Disorder; ODD = Oppositional Defiant Disorder.

**Table 4**  
 Associations Between PAPA Diagnoses and Psychosocial Functioning (M(SD))

	Depression		Anxiety		ADHD		ODD	
	Present	Absent	Present	Absent	Present	Absent	Present	Absent
CGAS	63.90(14.81)	84.54(13.91)	73.52(12.28)	86.75(13.40)	59.73(11.17)	84.67(13.80)	64.14(9.99)	86.24(12.88)
	<i>t</i> (539) = -4.65***		<i>t</i> (539) = -9.27***		<i>t</i> (539) = -5.95***		<i>t</i> (539) = -11.89***	
Vineland	16.55(5.13)	18.95(3.70)	18.54(3.82)	19.00(3.72)	16.64(1.69)	18.96(3.76)	16.53(3.33)	19.16(3.70)
	<i>t</i> (538) = -2.02*		<i>t</i> (538) = -1.13		<i>t</i> (538) = -2.04*		<i>t</i> (538) = -4.87***	

\*  $p < .05$ ;

\*\*\*  $p < .001$ .

*Note.* PAPA = Preschool Age Psychiatric Assessment; CGAS = Children's Global Assessment Scale; ADHD = Attention-Deficit/Hyperactivity Disorder; ODD = Oppositional Defiant Disorder.

**Table 5**

Means and Standard Deviations for Psychosocial Functioning as a Function of Number of Diagnoses

Psychosocial Functioning		Number of Diagnoses		
		0	1	2 or more
CGAS	<i>M</i>	89.01 <sup>a</sup>	74.21 <sup>b</sup>	65.52 <sup>c</sup>
	<i>SD</i>	11.54	11.81	11.61
Vineland	<i>M</i>	19.21 <sup>a</sup>	18.32 <sup>ab</sup>	17.74 <sup>b</sup>
	<i>SD</i>	3.72	3.41	4.16

*Note.* Different superscripts represent significant differences between means,  $p < .05$ . CGAS = Children's Global Assessment Scale.

**Table 6**

Correlations Between PAPA Symptom Scales and Psychosocial Functioning

	Depression	Anxiety	ADHD	ODD	CGAS	Vineland	Treatment
Depression	--	.38***	.12**	.24***	-.47***	-.12*	.16***
Anxiety	.44***	--	-.07	.09	-.50***	-.17***	.02
ADHD	.27***	.08	--	.44***	-.45***	-.28***	.32***
ODD	.38***	.22***	.48***	--	-.56***	-.27***	.21***

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

Note: In the analyses between symptom scales, correlations to the right of the diagonal reflect analyses conducted controlling for all other symptom scales. Correlations to the left of the diagonal reflect the associations without controlling for other symptom scales. PAPA = Preschool Age Psychiatric Assessment; ADHD = Attention-Deficit/Hyperactivity Disorder; ODD = Oppositional Defiant Disorder. CGAS = Children's Global Assessment Scale.