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Preschool Psychopathology: Continuity and Outcomes at Age 6

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Abstract of the Dissertation

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Relatively few studies have examined the continuity of preschool emotional and behavioral problems. Existing studies have typically focused on externalizing problems, included checklist measures that provided few details about symptoms, and used clinical samples that are subject to a variety of biases. Longitudinal studies are needed to elucidate the clinical significance and future implications of psychopathology in young children. This prospective study examined the stability of psychopathology in a large (N = 462) community sample of young children using a comprehensive diagnostic interview with parents. Specific emotional and behavioral symptoms were assessed at ages 3 and 6, and child, familial, and life stress variables were examined using multi-method assessment as possible predictors of continuity. The overall rates of disorders, level of comorbidity, and pattern of symptom covariation were relatively stable from age 3 to age 6. Rates of depression and attention-deficit hyperactivity disorder (ADHD) increased from age 3 to 6, whereas rates of generalized anxiety disorder (GAD) decreased. There was significant homotypic continuity between age 3 and age 6 for anxiety, ADHD, and oppositional defiant

disorder (ODD), and heterotypic continuity between depression and anxiety, anxiety and ODD, and ADHD and ODD. Age 3 anxiety, maternal depression and anxiety, and early stressors predicted an increase in depressive symptoms from age 3 to age 6. Age 3 ODD, child temperamental dysphoria, and maternal anxiety predicted an increase in anxiety symptoms. Finally, early stressors predicted an increase in ODD symptoms. In addition, there was a significant linear association between the sum of predictors present and an increase in levels of symptoms, suggesting that risk accumulates to predict a worse course of psychopathology. This study supports the validity of emotional and behavioral problems in preschoolers and contributes to our understanding of the course and clinical significance of psychopathology in young children. These findings should encourage the continued development of prevention and early intervention efforts targeting both emotional and behavioral problems and their developmental sequelae.

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Preschool Psychopathology: Continuity and Outcomes at Age 6

There is evidence to suggest that some preschoolers display psychiatric symptoms and disorders (Birmaher et al., 2009; Bufferd, Dougherty, Carlson, & Klein, 2011; Earls, 1982; Egger & Angold, 2006; Egger et al., 2006a; Keenan, Shaw, Walsh, Delliquadri, & Giovannelli, 1997; Lavigne et al., 1996; Lavigne, LeBailly, Hopkins, Gouze, Binns, 2009; Scheeringa & Haslett, 2010; Wilens, Biederman, Brown, Monuteaux, Prince, & Spencer, 2002). However, longitudinal studies are needed to better understand how to conceptualize symptoms and elucidate the clinical significance and future implications of psychopathology in young children. Studies exploring the course of psychopathology in preschoolers are particularly important in helping to distinguish developmentally normative behavior from clinically significant symptoms (Briggs-Gowan, Carter, Bosson-Heenan, Guyer, & Horwitz, 2006; Egger & Angold, 2006a), as this is a developmental period characterized by extensive and rapid change. The few existing studies that examine the continuity and discontinuity of early childhood symptoms and disorders tend to focus on externalizing problems (e.g., Harvey, Youngwirth, Thakar, & Errazuriz, 2009; Keenan et al., 2011; Lavigne et al., 2001; Owens & Shaw, 2003; Price et al., 2005) and use symptom checklist measures that provide few details about the nature and clinical significance of symptoms. Although research suggests that internalizing problems are also present in preschoolers (Egger & Angold, 2006b; Luby & Belden, 2006), much less attention has been paid to the stability of anxiety and depression in this population. In addition, studies of psychopathology in preschoolers have typically used clinical samples, which are subject to a variety of biases. Studies of community samples are needed to provide more representative and generalizable information about the presentation and continuity of preschool psychopathology.

The Surgeon General's report on children's mental health emphasized the need to examine the developmental underpinnings of psychopathology and promote intervention and prevention efforts aimed at young children (U.S. Public Health Service, 2000). Research suggests that as early as the preschool period, a considerable number of children appear to meet full or modified criteria for disorders such as major depression (Luby & Belden, 2006; Luby et al., 2002), anxiety disorders (Egger & Angold, 2006b), attention-deficit/hyperactivity disorder (ADHD; Egger & Angold, 2006a; Steinhoff et al, 2006) and oppositional defiant disorder (ODD; Rockhill, Collett, McClellan, & Speltz, 2006). Indeed, preschool psychopathology may be fairly common, and appears to be as prevalent as emotional and behavioral problems in school-age children (Bufferd et al., 2011; Egger & Angold, 2006a; Gadow, Sprafkin, & Nolan, 2001; Lavigne et al., 1996; Roberts, Attkisson, & Rosenblatt, 1998). The few studies that have assessed the prevalence of a range of psychiatric disorders in preschoolers suggest that 14.0-27.4% of preschoolers qualify for a psychiatric diagnosis (Bufferd et al., 2011; Earls, 1982; Egger et al., 2006a; Keenan et al., 1997; Lavigne et al., 1996; 2009). Estimates for more specific diagnostic categories include the following: depression (0.0-2.1%), specific phobia (0.0-11.5%), separation anxiety (0.5-5.4%), social phobia (2.0-4.6%), ADHD (2.0-12.8%), and ODD (4.0-16.8%). Estimates of comorbidity among disorders suggest that about one-quarter of preschoolers with a psychiatric disorder meet criteria for one or more additional diagnoses. To the limited 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 (Egger & Angold, 2006a; Lavigne et al., 2009).

Despite these data, the implications of psychopathology in preschoolers remain unclear. For example, diagnostic criteria and symptom scales developed for adults and older children may not adequately distinguish developmentally normative behavior from psychopathology in young children (Egger & Emde, 2011; Wakschlag, Leventhal, Thomas, & Pine, 2007). In addition, preschool assessment can be complicated by rapid changes in language, cognition, emotion, and social behavior that can influence symptom manifestations (Egger & Angold, 2006a), lack of self-report of symptoms (Angold, Egger, & Carter, 2007), and difficulty defining impairment given the limited range of settings as well as close connection to caregivers' functioning (Carter, Briggs-Gowan, & Davis, 2004). Still, using the existing nosology, evidence that prevalence rates in preschoolers are similar to those found in school-age children suggests that symptoms and disorders may emerge quite early and persist over time (Egger & Angold, 2006a; Gadow et al., 2001; Keenan et al., 2011; Lavigne et al., 1996; Roberts et al., 1998).

Unfortunately, there are few longitudinal studies designed to examine the stability of psychopathology in preschoolers, and most studies have been limited to externalizing problems such as oppositional and defiant behavior, attention deficits, hyperactivity, and impulsivity (e.g., Cole, Teti, Zahn-Waxler, 2003; Denham et al., 2000; Ercan, Somer, Amado, & Thompson, 2005; Harvey et al., 2009; Keenan et al., 2011; Keiley, Lofthouse, Bates, Dodge, & Pettit, G., 2003; Lahey et al., 2004; Lavigne et al, 2001; McGee, Partridge, Williams, & Silva, 1991; Owens & Shaw, 2003; Price et al., 2005; Speltz, McClellan, Deklyen, & Jones, 1999). Many of these studies show that externalizing disorders are at least moderately stable through school age, suggesting that many children do not "grow out" of their behavior problems. Less is known about the stability of internalizing disorders and symptoms in preschoolers and findings are less consistent (Bosquet & Egeland, 2006; Egeland, Kalkoske, Gottesman, & Erickson, 1990;

Fischer, Rolf, Hasazi, & Cummings, 1984; Keenan, Shaw, Delliquadri, Giovannelli, & Walsh, 1998; Lavigne, Arend, Rosenbaum, Binns, Christoffel, & Gibbons, 1998; Keiley et al., 2003; Lavigne, Gibbons, Arend, Rosenbaum, Binns, & Christoffel, 1999; Luby, Si, Belden, Tandon, & Spitznagel, 2009; Mesman, Bongers, & Koot, 2001; Mesman & Koot, 2001; Mian, Wainwright, Briggs-Gowan, & Carter, 2010; Pihlakoski, Sourander, Aromaa, Rautava, Helenius, & Sillanpää, 2006; Shaw, Keenan, Vondra, Delliquadri, & Giovannelli, 1997). These studies suggest that internalizing problems often persist through school age, though homotypic internalizing pathways may be less stable than homotypic externalizing pathways. However, many studies report broadband internalizing and externalizing symptom or diagnostic categories that do not provide sufficient detail.

The development of checklist measures to assess both broad (Achenbach, 1991; 1992) and specific symptom domains (e.g., Spence, Rapee, McDonald, & Ingam, 2001) 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 (Gadow et al., 2001; Koot & Verhulst, 1991; Pavuluri, Luk, & McGee, 1999; Richman, Stevenson, Graham, Ridgely, Goldman, & Talbott, 1974; Spence et al., 2001; Thomas, Byrne, Offord, & Boyle, 1991) and longitudinal (Beitchman, Wekerle, & Hood, 1987; Briggs-Gowan et al., 2006; Campbell & Ewing, 1990; Campbell, Ewing, Breaux, Szumowski, 1986; Cole et al., 2003; Denham et al., 2000; Egeland et al., 1990; Ercan et al., 2005; Fischer et al., 1984; Kashani, Holcomb, & Orvaschel, 1986; Keenan et al., 1998; Lavigne et al., 1998; 1999; McGee et al., 1991; Mesman et al., 2001; Mesman & Koot, 2001; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996; Owens & Shaw, 2003; Pihlakoski et al., 2006; Shaw et al., 1997; Speltz et al., 1999; Spieker, Larson,

Lewis, Keller, & Gilchrist, 1999) studies. This work has informed recent efforts to modify diagnostic criteria for preschoolers (Egger & Emde, 2011; Task Force on Research Diagnostic Criteria, 2003), apply principles of developmental science to distinguish normative from non-normative behavior (Wakschlag, Tolan, & Leventhal, 2010), and develop structured diagnostic interviews to assess psychopathology in young children (Birmaher et al., 2009; Egger, Ascher, & Angold, 1999; Lucas, Fisher, & Luby, 1998; Scheeringa & Haslett, 2010).

However, the use of checklist measures provides few details about the nature, duration, and clinical significance of symptoms and does not permit an evaluation of the prevalence or stability of diagnostic categories. Only two follow-up studies of preschool-aged children assessing a broad range of psychopathology included a psychiatric interview (Lavigne et al., 1998; Mesman & Koot, 2001). However, the interviews were not conducted during the initial, preschool age assessment (i.e., only the CBCL was used at the age 3 assessment; interviews were not used until ages 7 and 10, respectively; Lavigne et al., 1998; Mesman & Koot, 2001).

Previous studies are also limited by samples that were relatively small and were either considered "high risk" (Egeland et al., 1990) or obtained from social service (Keenan et al., 1998; Owens & Shaw, 2003; Shaw et al., 1997), psychiatric clinic (e.g., Keenan et al., 2011; Speltz et al., 1999), or primary care (Keenan et al., 2011; Lavigne et al., 1998; 1999; 2001; Pihlakoski et al., 2006) settings. Notably, some studies used community samples (Briggs-Gowan et al., 2006; Cole et al., 2003; Fischer et al., 1984; Mesman & Koot, 2001; Mesman et al., 2001; Price et al., 2005), but the use of behavior checklists in these studies limits the extent to which the stability of clinically significant psychopathology and specific diagnoses could be examined.

To address these gaps in the literature, the present study will examine the stability and continuity of specific internalizing and externalizing problems in a large community sample of

preschoolers using a comprehensive psychiatric interview designed for use in this population. The stability of symptoms and diagnoses from ages 3 to 6 years would support the validity of current conceptualizations of psychopathology in preschoolers and encourage the development of prevention and early intervention efforts targeting both the emotional and behavior problems and their developmental sequelae. Moreover, information about homotypic and heterotypic continuity is critical for understanding the developmental course of specific disorders and refining the classification of preschool psychopathology.

In addition to determining the degree of stability, it is important to identify predictors of the course of psychopathology. This can provide useful prognostic information for clinicians and families, identify subgroups of children who are in greatest need for early intervention and services, and provide clues to processes influencing the course of psychopathology in young children. Unfortunately, few studies have explored predictors of the course of the range of psychopathology. The studies that have examined possible predictors assessed a wide range of factors: child variables, such as child's sex (Mesman et al., 2001; Spieker et al., 1999), temperament (Owens & Shaw, 2003), and co-occurring symptoms (Briggs-Gowan et al., 2006; Keenan et al., 2011); parent variables, such as parenting style (Spieker et al., 1999; McFayden-Ketchum, Bates, Dodge, & Pettit, 1996) and maternal psychopathology/ negative affect (Briggs-Gowan et al., 2006; Egeland et al., 1990; Munson, McMahon, & Spieker, 2001; Owens & Shaw, 2003; Spieker et al., 1999); and environmental variables, such as stressful life events (Egeland et al., 1990; Lavigne et al.,1998) and the quality of the home environment (Egeland et al., 1990). However, the findings of these studies are inconsistent and, like other studies of preschool psychopathology, the majority focused on externalizing problems. Further, most of this work is based on the use of behavior checklists rather than thorough diagnostic assessments.

The present study will address this gap in the literature by examining predictors of age 6 symptoms in a large community sample while controlling for age 3 symptoms. Following Cicchetti (Cicchetti & Cohen, 2006; Cicchetti & Valentino, 2007), we conceptualize the course of child psychopathology as being influenced by variables in multiple domains. In this study, we will consider variables from three broad domains that subsume most predictors examined in previous studies: child, family, and life stress (Campbell, 1995). Child predictors will include child temperament and co-occurring symptoms at age 3, familial predictors will include maternal psychopathology and parenting behavior at age 3, and life stress will include proximal stressors involving the child or immediate family members 12 months prior to the age 6 interview, as well as early stressors involving the child or immediate family members from the time the child was born until the age 3 interview. These predictors will be examined in relation to change in symptoms, rather than diagnoses, from age 3 to age 6. Dimensional symptoms scale scores are used in these analyses given that the distribution of underlying psychopathology appears to be continuous in nature and dimensional measurement is considered to more accurately reflect the processes that confer risk for psychopathology (Egger & Emde, 2011).

A number of studies of youths indicate that extreme temperament/personality traits are associated with poorer outcomes in a variety of disorders (Caspi, Henry, McGee, Moffitt, & Silva, 1995; Johnson, Cohen, Skodol, Oldham, Kasen, & Brook, 1999; Moffitt & Caspi, 2001). Extreme temperament traits may represent stable vulnerabilities to, or early manifestations of, psychopathology (Lahey, 2004), and can constrain children's ability to cope effectively with stress (Compas, Conner-Smith, & Jaser, 2004).

Children's co-occurring symptoms predicts greater persistence and risk of recurrence in a variety of psychiatric disorders (Briggs-Gowan, Owens, Schwab-Stone, Leventhal, Leaf, &

Horwitz, 2003; Keenan et al., 2011; Pickles, Rowe, Simonoff, Foley, Rutter, & Silberg, 2001). This process could occur if one set of symptoms contribute to circumstances for other problems to develop (Caron & Rutter, 1991) and/or if expressions of symptoms vary over the course of development (Rutter, Kim-Cohen, & Maughan, 2006), as hypothesized, for example, in the link between early anxiety and later risk for depression (e.g., Rice, van den Bree, & Thapar, 2004). It is also likely that co-occuring symptoms are a marker for more severe psychopathology.

Maternal psychopathology is also associated with more persistent psychopathology in children and adolescents (Ashford, Smit, Van Lier, Cuijpers, & Koot, 2008; Garber, Keiley, & Martin, 2002; Luby et al., 2009; Mesman & Koot, 2000; Rohde, Lewinsohn, Klein, & Seeley, 2005; Sterba, Prinstein, & Cox, 2007; Weissman, Wickramaratne, Nomura, Warner, Pilowsky, & Verdeli, 2006). It may be a marker of greater genetic vulnerability, as well as an environmental stressor that contributes to child emotional and behavior problems (Goodman & Gotlib, 1999).

Parents play a central role in the lives of young children, and maladaptive parenting has been associated with a poorer course and outcome in a variety of disorders in children and adolescents (Asarnow, Goldstein, Tompson, & Guthrie, 1993; Hayden & Klein, 2001; Hipwell, Keenan, Kasza, Loeber, Stouthamer-Loeber, & Bean, 2008; McCleary & Sanford, 2002). Poor parenting may interfere with the development of self-regulation, social competence, and self-esteem and be a source of both chronic and acute stress (Grant et al., 2006; Milevsky, Schlechter, Netter, & Keehn, 2007; Prevatt, 2003; Steinberg, Lamborn, Darling, Mounts, & Dornbusch, 1994).

Lastly, stressful life events also predict persistence of psychopathology in youth (Goodyer, 2001). Parent and child behavior may contribute to the occurrence of life stressors via stress generation processes (Rudolph, Hammen, Burge, Lindberg, Herzberg, & Daley, 2000). At

the same time, life stressors can disrupt the family system and tax children's and families' coping and other resources influencing the onset and course of child psychopathology (Birmaher, Arbelaez, & Brent, 2002; Compas et al., 2004; Grant, Compas, Thurm, McMahon, & Gipson, 2004; Grant et al., 2006; Goodyer, 2001). In this study, early stressors within the first 3 years of the child's life may confer a vulnerability to emotional and behavioral problems, whereas proximal stressors occurring within the year prior to the age 6 assessment may serve to trigger existing susceptibilities.

Thus, we assessed specific emotional and behavioral disorders in preschoolers using a comprehensive diagnostic interview (the Preschool Age Psychiatric Assessment; PAPA; Egger et al., 1999) as part of a prospective longitudinal study of a large community sample. Using data collected at ages 3 and 6, we examined the stability of internalizing and externalizing disorders and symptoms as well as predictors of the course of psychopathology in early childhood. The specific aims were to:

1. Compare the rates of diagnoses and levels of dimensional symptom scale scores for emotional and behavioral problems in 6-year olds to those found at age 3.
2. Explore the homotypic continuity of disorders and stability of symptoms.
3. Compare the patterns of concurrent comorbidity among disorders and covariation between symptom scales at age 3 with those at age 6.
4. Explore the heterotypic continuity of disorders and stability symptoms.
5. Examine predictors of symptoms of psychopathology at age 6 controlling for age 3 symptoms. Three domains of predictors will be included: child (temperament, co-occurring symptoms), family (maternal psychopathology, parenting behavior) and life stress.

Method

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 at time 1 (n = 541) 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 for their participation.

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 (Olson, Mignone, & Harlap, 2000).

The first wave of data collection when children were age 3 occurred from November 2004 through July 2007. Only one child per family was assessed. Families were informed that we planned to conduct a follow-up assessment about 3 years after their first visit. They provided

extensive contact information to ensure we could reach them. In addition, we remained in touch with all families by mailing them semi-annual study newsletters and maintaining a study website. The second wave of data collection occurred from September 2007 through June 2010 when children were age 6.

Five hundred forty-one parents were interviewed regarding their 3-year-old child (time 1, *M* age = 3.6 years, *SD* = 0.3), and 462 of these parents (85.4%) were interviewed again when their child turned 6 years old (time 2, *M age* = 6.1 years (*SD* = 0.4). The mean length of time between interviews was 2.5 years (*SD* = 0.4; *Range* = 1.6-4.4). There were no significant associations between the length of time between interviews and any of the age 3 or age 6 PAPA diagnoses and symptom scales. Children who completed the first assessment at age 3 were compared to children who did not complete the second assessment on demographic and age 3 PAPA variables. There was one significant difference: 85.9% of children without depression at age 3 were assessed again at age 6 (456/531) whereas only 60.0% of children with depression at age 3 (6/10) were assessed again at age 6, χ^2 (1, N = 541) = 5.27, $p < .05$. No differences were found on any demographic or other age 3 PAPA variables.

Table 1 lists the demographic information for the study sample. 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; and 48.1% of adults aged 25-54 graduated from college.

Measures

Child Psychopathology. The Preschool Age Psychiatric Assessment (PAPA; Version 1.4; Egger et al., 1999). The PAPA is the first published diagnostic interview designed to assess a comprehensive set of symptoms from the Diagnostic and Statistical Manual (4th edition, text

revision; DSM-IV-TR; American Psychiatric Association, 2000) in preschoolers ages 2 to 5. The PAPA was used for both assessments although the children were 6 years old at the follow-up. There are instruments available for use in school-age children, but most are designed for children 8 years and older, and none appear to be as developmentally appropriate for 6-year olds as the PAPA. Moreover, we wanted to maintain comparability of assessments across the two waves. In a personal communication, Egger (2007) indicated that she has used the PAPA with 6-year olds and recommended that we continue to use the PAPA with our sample at age 6.

The PAPA 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 recorded 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 (Egger et al., 2006a).

DSM-IV diagnoses were 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) disorder; behavioral disorders included attention-deficit/hyperactivity disorder (ADHD) or oppositional defiant disorder (ODD). Panic disorder was also assessed, but no participants were diagnosed with this disorder so it was excluded from analyses. 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 disorder scales would not be expected to be normally distributed, we did not transform these variables.

Following Egger et al. (2006), 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. Cutoffs were established separately at age 3 and age 6.

At the age 3 assessment, interviews were conducted by advanced graduate students in clinical psychology who received training on PAPA administration from a member of the PAPA group. 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 problems to ensure adequate variability. Kappas were 1.00 for all diagnostic categories (except selective mutism, which neither rater diagnosed in this subsample), including the broad category of any anxiety disorder. ICCs for the symptom scales were: depression (.96), anxiety (.99), ADHD (.99), and ODD (.99). Internal consistency (α) of the symptom scales was: depression (.69), anxiety (.81), ADHD (.90) and ODD (.87).

At the age 6 assessment, the majority of the interviews were conducted by an M.A.-level psychologist with extensive experience with structured diagnostic interviews. This interviewer did not administer the PAPA at age 3, and was not aware of the results of the age 3 assessments. To examine interrater reliability, a second diagnostician (an advanced graduate student) rated audiotapes of 35 PAPA interviews, again oversampling participants with higher levels of psychopathology. Kappas were: depression (.64), any anxiety disorder (.89), separation anxiety

(1.00), specific phobia (.79), agoraphobia (1.00), ADHD (.64) and ODD (.87) (neither rater diagnosed other anxiety disorders in this subsample). ICCs for the symptom scales were: depression (.95), anxiety (.71), ADHD (.97), and ODD (.97). Internal consistency (α) of the symptom scales was: depression (.74), anxiety (.85), ADHD (.88) and ODD (.79).

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 (Gadow & Sprafkin, 2000). Parents completed the ADHD and ODD sections of the inventory at the initial age 3 assessment only. The correct classification rates for ADHD and ODD with respect to chart diagnoses were 60% and 74%, respectively (Sprafkin, Volpe, Gadow, Nolan, & Kelly, 2002). 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 at the age 3 assessment, in the first 60% of the original sample (n = 324/541), 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 to reduce administration time. 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 original sample (n = 217/541), the PAPA ADHD and ODD sections were administered to all parents when it was found that completing all sections did not burden interviewees. However, all results were similar when analyses were limited to the 40% of the sample who received the complete PAPA ADHD and ODD sections. For the part of the sample that did not receive the full ADHD and ODD

sections, age 3 symptoms were assumed to be absent after the interviewer confirmed the absence of key symptoms. At the age 6 assessment, all sections were administered to all parents.

Child Temperament. Child temperament was measured at age 3 using the Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith, Reilly, Lemery, Longley, & Prescott, 1995) in which each child participated in a standardized set of tasks designed to elicit various manifestations of temperament-relevant behavior. Each task was videotaped through a one-way mirror and coded by graduate students, study staff, and undergraduate research assistants who completed extensive training. Coders were unaware of other study variables and had to reach at least 80% agreement with a "master" rater before coding independently. Facial, bodily, and vocal indicators of affect were coded, as well as temperament-relevant behaviors such as interest and impulsivity. Following Kagan and colleagues (Kagan, Snidman, Kahn, & Towsley, 2007), behavioral inhibition was coded using a composite of affect, behavior, and latency variables. To reduce the number of temperament variables, a principal components analysis was conducted (Dougherty, Bufferd, Carlson, Dyson, Olino, & Klein, 2011). For the present study, the following temperament component scores were included and showed good internal consistency (alpha) and interrater reliability (ICC): dysphoria (.80 and .88, respectively), fear/inhibition (.71 and .82, respectively), exuberance (.88 and .92, respectively), and disinhibition (.70 and .83, respectively).

Co-occurring symptoms. The dimensional symptom scales derived from the PAPA at age 3 were used as child-level predictors. In each set of analyses across the four sets of symptom areas, the other three dimensional scale scores were included as predictors. For example, in analyses involving depressive symptoms, age 3 anxiety, ADHD, and ODD symptom scale scores were included as independent variables.

Maternal Psychopathology. Axis I DSM-IV disorders were assessed in the child's biological mother at the first wave of data collection using the Structured Clinical Interview for DSM, Non-Patient (SCID-NP; First, Gibbon, Spitzer, & Williams, 1996). The SCID is a widely used semi-structured diagnostic interview for adults, with well-established reliability and validity. For the one mother who could not be interviewed, we collected informant data from the other parent using the Family History Research Diagnostic Criteria (FH-RDC) interview guide (Andreasen, Endicott, Spitzer, & Winokur, 1977). The SCIDs were completed primarily by an M.A.-level psychologist with extensive experience conducting SCID interviews in clinical and non-clinical individuals. Raters were blind to all data on child psychopathology and temperament. Rates of lifetime mood, anxiety, and substance use disorders in mothers were 32.6%, 34.3%, and 22.1%, respectively. Interrater reliability (kappa) of SCID lifetime mood, anxiety, and substance use disorders were .93, .91, and 1.00, respectively.

Parenting Behavior. At age 3, the child and the parent (typically the mother) participated in 6 standardized interaction tasks designed to elicit various parenting behaviors based on a modified version of the Teaching Tasks battery (Egeland, Weinfield, Hiester, Lawrence, Pierce, & Chippendale, 1995). Interactions were videotaped and later coded. Coders were unaware of other study variables and were required to reach 80% agreement with a "master" rater before coding independently. Three scales were selected for use in this study: parental supportive presence (α = .88), intrusiveness (α = .61), and hostility (α = .76). Interrater reliability ICCs were .85, .70, and .83, respectively. The correlations between the scale items were: supportive presence (reverse-scored) and intrusiveness (r = .31) and hostility (r = .66), and intrusiveness and hostility (r = .42), all ps < .001. The internal consistency of the scale (alpha) was .69.

Life Stressors. The PAPA assesses stressful life events involving the child and immediate family members, including parental separation, serious illnesses and accidents, significant losses, and traumatic experiences. In this study, life stress included early stressors involving the child or immediate family members from the time the child was born until the age 3 interview as well as proximal stressors involving the child or immediate family members 12 months prior to the age 6 interview. The number of stressors in each category were summed to create two scales (early stressors: *M* = 4.07, *SD* = 2.75, *Range* = 0-15, interrater ICC = .99; recent stressors: *M* = 2.31, *SD* = 1.79, *Range* = 0-12, interrater ICC = .90).

Procedure

Age 3. Children and their primary caretakers visited the laboratory at Stony Brook University twice, each time for about 2 hours. The first visit included the Lab-TAB; the second visit included the Teaching Tasks parent-child interaction and a variety of other measures. Mothers completed interviews of their psychopathology (SCID) and their child's psychopathology (PAPA) by telephone. Interviews usually lasted 1½-2 hours.

Age 6. The PAPA was administered to the primary caretaker during a laboratory visit. Interviews usually lasted 1½-2 hours. Several studies of community samples have reported that diagnostic interviews administered by telephone yield equivalent results to in-person interviews for adults (Rohde, Lewinsohn, & Seeley, 1997; Sobin et al., 1993) and children (Lyneham & Rapee, 2005).

Data Analyses

Anxiety disorders were analyzed as individual disorders as well as an aggregate of all of the disorders in the category. Individual depressive disorders were analyzed as a single category due to their low prevalence.

McNemar's tests were used to compare rates of diagnoses between the age 3 and age 6 assessments. Paired samples *t*-tests were used to compare mean dimensional symptom scale scores across assessments.

To examine the associations between diagnoses over time, odds ratios (ORs) were computed using binary logistic regression with age 3 diagnoses entered as independent variables (IVs) and age 6 diagnoses entered as dependent variables (DVs). This procedure yielded the odds (and 95% confidence interval; CI) of a diagnosis at age 6 given an age 3 diagnosis. Concurrent comorbidity was controlled for in the heterotypic analyses (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Bivariate correlations were calculated between dimensional symptom scales in each diagnostic category to examine the rank-order agreement between these scores at ages 3 and 6. Concurrent comorbidity was again controlled for in the heterotypic analyses. Intraclass correlations were considered for the homotypic analyses, but the use of bivariate correlations will ensure that the homotypic and heterotypic analyses are comparable.

Concurrent comorbidity among disorders at ages 3 and 6 was examined using binary logistic regression and comparing the magnitudes of the ORs between the two time points. Both the bivariate and unique associations between diagnoses were examined, hence unadjusted and adjusted ORs are presented along with 95% CIs. To determine whether comorbidity occurred at rates above chance, calculations were conducted based on a procedure outlined by Caron and Rutter (1991). The ratio of observed frequency (O) of comorbidity between each diagnostic pair to the frequency expected by chance (E, calculated as disorder 1 rate x 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 exceeded chance. Additionally, bivariate correlations

were computed to examine the concurrent covariation between symptom scales at ages 3 and 6, and the magnitudes of the correlations were compared using Fisher r to z tests.

In both the analyses of diagnoses and symptom scales, child sex and race, and parental education and marital status were included as covariates when there was a bivariate association with the DV (see Table 2).

Due to the large number of analyses, we examined only the dimensional scale scores for the four major diagnostic categories (depression, anxiety, ADHD, ODD) to examine predictors of change from age 3 to age 6. Predictors included variables from each of three domains: child (co-occurring symtpoms, temperament), family (maternal psychopathology, parenting behavior), and life stressors (early and recent). Child temperament predictors included exuberance, dysphoria, and disinhibition and fear/inhibition. The first three variables correspond to the higher-order factors in Rothbart's influential model: surgency, negative affectivity, and effortful control (Rothbart, Ahadi, Hersey, & Fisher, 2001). Behavioral inhibition includes elements of each of these three other factors (Laptook, Klein, Olino, Dyson, & Carlson, 2010), but was included due to its prominence in the literature on the association of early temperament with psychopathology (Klein, Dyson, Kujawa, & Kotov, in press). Co-occurring symptoms assessed by the PAPA at age 3 were also included as child-level predictors. For each analysis, the other three symptom scales were included as IVs. Three forms of maternal psychopathology (SCID) were included as predictors: lifetime mood, anxiety, and substance use disorders. Three parenting variables from the age 3 Teaching Tasks assessment were used, including parental supportive presence, intrusiveness, and hostility. These variables correspond to the 3 key dimensions that have been identified in many factor-analytic studies of parenting behavior (Kendler, 1996). Finally, life stressors included two variables: a count of child and family

stressors occurring in the 12 months prior to the age 6 PAPA and any time in the child's life prior to the age 3 PAPA. Although it may be possible to make predictions about differential associations between some specific predictors and change in some specific disorders, the limited literature makes it difficult to do so with confidence. Therefore, the set of predictors was tested for each of the four domains of child psychopathology.

We tested the associations using simultaneous multiple regression, rather than structural equation modeling, as some of the variables in each multivariable domain (child and family) are relatively independent and cannot be used as indicators of a latent variable. Separate analyses were run for depression, anxiety, ADHD, and ODD. The DV was each age 6 symptom scale. The corresponding age 3 symptom scale, demographic variables with significant associations with the age 6 scale (Table 2), and the child, family, and life stress variables were entered as IVs. We also examined whether child sex and stressors moderated the effects of the other predictors. Due to the large number of interactions to test, we first screened for significant interactions by running regressions with each predictor, moderator, and interaction term. Then we entered the interactions that were significant into the full regression models that included all the predictors. Results are reported below when interactions were significant in both sets of regressions.

To examine whether the accumulation of predictors has an impact on the course of psychopathology, the association between number of predictors present and change in symptom scales was analyzed using multiple regression. Continuous predictors were dichotomized using a cutoff of 1 standard deviation (SD) above or below the mean based on the valence of the variable (e.g., 1 SD above the mean of stressors; 1 SD below the mean of exuberance) and summed to create a risk variable. Nonlinear relationships between the number of predictors and symptom change were explored by adding polynomial terms to the model.

Tests were two-tailed, and alpha was set at 0.05.

Results

Associations with Demographic Variables

See Table 2 for the associations between demographic variables and the age 3 and age 6 PAPA diagnoses and symptom scales. Given that the focus of the study is on outcomes at age 6, the analyses below will also be presented when controlling for the demographic variables with significant associations with the four major sets of 6 PAPA variables (depression, anxiety, ADHD, ODD). At age 6, child race (0 = non-white, 1 = white) is negatively associated with the depression and ODD diagnoses, and the depression, ADHD, and ODD scales. Child sex (0 = male, 1 = female) is negatively associated with the anxiety scale. Child age is positively associated with the ADHD scale. Parents' education (0 = neither parent graduate college, 1 = at least 1 parent graduated college) is negatively associated with the depression diagnosis and negatively associated with the depression and ODD scales. Parents' marital status (0 = unmarried, 1 = married) is negatively associated with the ADHD diagnosis, and the depression and ADHD scales.

Rates of Diagnoses and Levels of Symptom Scales

The first aim was to compare the rates of diagnoses and levels of dimensional symptom scale scores for emotional and behavioral disorders in 6-year olds to those found at age 3. Table 3 shows the rates of diagnoses at the age 3 and age 6 assessments. 13.9% (64/462) of the sample met criteria for any disorder at both time points; 50.4% (64/127) of children who met criteria for a diagnosis at age 3 also met criteria for a diagnosis at age 6; 52.0% (64/123) of children who met criteria for a diagnosis at age 6 also met criteria for a diagnosis at age 3. Meeting criteria for

a diagnosis at age 3 was significantly associated with meeting criteria for a diagnosis at age 6 (OR=4.74, $p<.001$, 95%CI=3.04-7.43).

McNemar's test was used to compare rates of diagnoses between the age 3 and age 6 assessments (see Table 4). Out of the 10 disorders assessed, there was a significant increase in rates for 2 disorders (depression/dysthymia and ADHD), decrease for 1 disorder (GAD), and no significant difference for 7 disorders (depression NOS, specific phobia, separation anxiety disorder, social phobia, agoraphobia, selective mutism, and ODD) from age 3 to age 6. The overall rates of diagnoses were relatively stable from age 3 to age 6. These results were identical when controlling for demographic variables as described above.

To compare mean dimensional symptom scale scores across assessments, paired samples t-tests were run for the four diagnostic categories (see Table 5). There was a significant increase in mean levels of symptoms from age 3 to age 6 for the depression, anxiety, and ADHD symptom scales; there was no significant change in the ODD symptom scale.

Homotypic Continuity of Psychopathology

The second aim was to explore the homotypic continuity of psychopathology in preschoolers, including the homotypic continuity of disorders, and the homotypic stability of symptoms.

To examine the continuity of disorders, odds ratios were computed using binary logistic regression with age 3 diagnoses entered as independent variables (IVs) and age 6 diagnoses entered as dependent variables (DVs) to yield the odds of a diagnosis at age 6 given an age 3 diagnosis (see Table 6). There were significant associations between age 3 and age 6 anxiety, ADHD, and ODD. The homotypic analysis could not be not computed for depression because there were no cases at age 3 that remained a case at age 6 (see Table 4). These analyses were also

conducted with each of the anxiety disorder diagnoses. There was significant continuity between 5 of the 6 anxiety disorders assessed: specific phobia (OR = 2.87, p < .05, CI = 1.23-6.73), separation anxiety (OR = 7.88, p < .001, CI = 2.78-22.28), social phobia (OR = 60.14, p < .001, CI = 14.84-243.74), agoraphobia (OR = 22.10, p < .001, CI = 4.73-103.29), and selective mutism (OR = 37.75, p < .01, CI = 3.00-474.83).

Bivariate correlations were calculated between dimensional symptom scales within each diagnostic category to examine the rank-order agreement between these scores at ages 3 and 6 (see Table 7). Each of the age 3 symptom scales was significantly associated with its corresponding age 6 symptom scale. However, the magnitude of the homotypic depression correlation was significantly lower than the homotypic anxiety and ADHD correlations, $p < .05$; the magnitudes of the anxiety, ADHD, and ODD homotypic correlations were not significantly different. These results were identical when controlling for demographic variables as described above.

Comorbidity Between Diagnoses and Symptom Scales

The third aim was to examine rates of concurrent comorbidity at age 3 and age 6. The rates of concurrent comorbidity among the four disorder categories are presented in Table 8. At age 3, 9.1% (42/462) met criteria for two or more diagnoses; 33.3% (42/126) of those with at least one diagnosis met criteria for multiple diagnoses. At age 6, 8.9% (41/462) met criteria for two or more diagnoses; 33.3% (41/123) of those with at least one diagnosis met criteria for multiple diagnoses. McNemar's tests were conducted for pairs of individual disorders; none of the analyses were significant, suggesting there the rates of comorbidity did not change from age 3 to 6 (although cell sizes may have been too small to detect changes).

Table 9 shows the results of binary logistic regressions to compare the magnitudes of the odds ratios between the four categories of disorders over the two time points. These results were identical when controlling for demographic variables as described above.

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 (Angold, Costello, & Erkanli, 1999). At age 3, there was significant comorbidity between depression and anxiety, depression and ODD, and ODD and ADHD. Controlling for other diagnoses slightly weakened, but did not eliminate the comorbid associations. At age 6, the pattern of associations was similar, though there was also significant comorbidity between depression and ADHD. The magnitudes of the odds ratios are somewhat smaller at age 6 compared to age 3; however, the 95% CIs overlapped for each pair of diagnoses at age 3 and age 6, suggesting there are no significant differences in the rates of comorbidity over the two time points. The rate of comorbidity was significantly higher than expected by chance between each pair of diagnoses with significant ORs (Age 3: depression and anxiety, O/E = 2.56, CI = 0.05-5.08; depression and ODD, O/E = 6.56, CI = 0.13-12.98; ADHD and ODD, O/E = 6.25, CI = 1.62-10.88; Age 6: depression and anxiety, O/E = 2.56, CI = 0.97-4.15; depression and ADHD, O/E = 4.44, CI = 0.89-8.00; depression and ODD, O/E = 4.95, CI = 2.03-7.88; ADHD and ODD, O/E = 4.05, CI = 1.41-6.70).

The comorbidity for each of the specific anxiety disorders using logistic regressions was also examined. The results presented here reflect associations while controlling for all other diagnoses. At age 3, significant associations were observed between specific phobia and separation anxiety (OR = 5.27, $p < .01$, CI = 1.96-14.17), GAD (OR = 3.44, $p < .05$, CI = 1.02-11.56), and selective mutism (OR = 6.35, $p < .05$, CI = 1.05-38.30); separation anxiety disorder

and GAD (OR = 7.96, p < .01, CI = 2.41-26.30); social phobia and agoraphobia (OR = 18.46, p < .001, CI = 4.51-75.60) and selective mutism (OR = 34.08, p < .001, CI = 5.64-206.08). At age 6, significant associations were observed between specific phobia and social phobia (OR = 10.83, p < .05, CI = 1.34-87.71); social phobia and depression (OR = 54.84, p < .001, CI = 5.88-511.64); GAD and depression (OR = 36.24, p < .01, CI = 4.12-318.73) and agoraphobia (OR = 33.59, p < .05, CI = 1.70-665.53); and agoraphobia and ODD (OR = 14.76, p < .01, CI = 2.69-81.06).

Bivariate correlations were computed to examine the concurrent covariation between symptom scales at ages 3 and 6 (see Table 10). All scales were significantly correlated at both time points. The analyses were also conducted controlling for the other symptom scales in order to examine whether the associations were accounted for by covariation with other scales. Controlling for other symptom scales slightly weakened the associations and eliminated the associations between the anxiety and ADHD symptom scales, and anxiety and ODD symptom scales at both age 3 and age 6. These results were identical when controlling for demographic variables as described above.

The magnitudes of the correlations between each pair of symptom scales were compared across time points. There was a significant difference between the magnitudes of the correlations between depression and anxiety at age 3 (r = .49) and age 6 (r = .57), Z = -1.69, p < .05, such that that symptoms of depression and anxiety covaried at a higher level at age 6 than at age 3. There were no significant differences between the magnitudes of the correlations between any other pairs of symptom scales, suggesting that the pattern of symptom covariation were similar at age 3 and age 6.

Heterotypic Continuity of Psychopathology

The fourth aim was to explore the heterotypic continuity of psychopathology in preschoolers, including the heterotypic continuity of disorders, and the heterotypic stability of symptoms.

To examine the continuity of disorders, odds ratios were computed using binary logistic regression with age 3 diagnoses entered as independent variables (IVs) and age 6 diagnoses entered as dependent variables (DVs) to yield the odds of a diagnosis at age 6 given an age 3 diagnosis (see Table 6). There were significant associations between age 3 depression and age 6 anxiety, age 3 anxiety and age 6 depression, age 3 anxiety and age 6 ODD, age 3 ADHD and age 6 ODD, age 3 ODD and age 6 ADHD, and a trend-level association between age 3 depression and age 6 ODD (p = .06). After controlling for any significant concurrent age 6 comorbidity, the results remained significant for each of these associations, with the exception of age 3 anxiety and age 6 depression (there was no concurrent comorbidity between age 6 anxiety and ODD, so there was no control for this analysis). These results were identical when controlling for demographic variables as described above.

These analyses were also conducted with each of the specific anxiety disorder diagnoses. Analyses were conducted without controlling for concurrent comorbidity and repeated controlling for concurrent comorbidity when there were significant associations between two age 6 diagnoses. There were significant associations between age 3 depression and age 6 separation anxiety (OR = 10.90, p < .01, CI = 1.88-63.08) and age 6 social phobia (OR = 9.93, p < .05, CI = 1.05-93.88; this association remained after controlling for concurrent age 6 comorbidity between depression and social phobia); age 3 social phobia and age 6 specific phobia (OR = 5.20, p < .01, CI = 1.73-15.67; this association remained after controlling for concurrent age 6 comorbidity between social phobia and specific phobia); age 3 separation anxiety and age 6 depression (OR =

4.96, p < .01, CI = 1.69-14.349), age 6 ODD (OR = 6.68, p < .001, CI = 2.76-16.19), and age 6 agoraphobia (OR = 5.97, p < .05, CI = 1.14-31.17); age 3 agoraphobia and age 6 depression (OR = 4.83, p < .05, CI = 1.27-18.37), age 6 specific phobia (OR = 4.42, p < .05, CI = 1.34-14.62), age 6 social phobia (OR = 15.71, p < .001, CI = 3.62-68.28), age 6 GAD (OR = 13.60, p < .01, CI = 2.41-76.72; however, this association does not remain after controlling for concurrent age 6 comorbidity between agoraphobia and GAD), and age 6 selective mutism (OR = 15.89, p < .05, CI = 1.36-185.78); and age 3 selective mutism and age 6 GAD (OR = 12.47, p < .05, CI = 1.30-120.13).

Bivariate correlations were calculated between dimensional symptom scales within each diagnostic category to examine the rank-order agreement between these scores at ages 3 and 6 (see Table 7). Analyses were also run controlling for concurrent comorbidity in the heterotypic analyses. Each of the age 3 symptom scales was significantly associated with each age 6 symptom scale (with the exception of age 3 anxiety and age 6 ADHD). When controlling for concurrent comorbidity, the following associations remained: age 3 depression and age 6 ADHD and age 6 ODD; age 3 anxiety and age 6 ODD; age 3 ADHD and age 6 ODD; and age 3 ODD and age 6 ADHD; the association between age 3 anxiety and age 6 depression was significant at the trend level. These results were identical when controlling for demographic variables as described above.

Predictors of Age 6 Psychopathology

The fifth aim was to examine predictors of continuity of symptoms of psychopathology from age 3 to age 6. Three domains of predictors were included: child (co-occurring symptoms, temperament), family (maternal psychopathology, parenting behavior) and life stress. See Table 11 for the zero-order correlations among the predictor variables and PAPA symptom scales.

Separate simultaneous multiple regressions were conducted using dimensional scale scores for the four major diagnostic categories (depression, anxiety, ADHD, ODD). The DV was each age 6 symptom scale. The corresponding age 3 symptom scale, demographic variables with significant associations with each age 6 symptom scale, and the child, family, and life stress variables were entered as IVs. Table 12 shows the results of these regressions. Parental education, parental marital status, age 3 anxiety symptoms, maternal mood disorder, maternal anxiety disorder, and early stressors predicted an increase in depressive symptoms. Fewer age 3 ODD symptoms, temperamental dysphoria, and maternal anxiety disorder predicted an increase in anxiety symptoms. Race and the child's age predicted an increase in ADHD symptoms. Finally, early stressors predicted an increase in ODD symptoms.

Moderation with sex, early stressors, and recent stressors. The effect of child sex, early stressors, and recent stressors on the predictor variables in relation to age 6 symptoms was examined as described above. There were no significant interactions with child sex or recent stress. There was a significant interaction between early stressors and maternal intrusiveness in predicting change in anxiety symptoms, B = .87, SE = .31, p < .01. For children with lower levels of early stress, anxiety symptoms declined as maternal intrusiveness increased (B = -2.75, SE = 1.21, $p < .05$), whereas there was a trend for children with higher levels of early stress to experience greater anxiety at higher levels of maternal intrusiveness (B = 2.02, SE = 1.18, $p = .09$). This interaction was also significant when all predictors were included in the regression.

Accumulation of predictors. Finally, to examine whether the accumulation of predictors has an impact on the course of psychopathology, the association between number of predictors and demographic risk variables present and age 6 symptom scales (controlling for age 3 symptom scales) were analyzed using multiple regression. There was a significant linear

association between the sum of the number of predictors present and increases in depressive (B = .46, SE = .07, $p < .001$, adjusted $R^2 = .26$, $R^2 \Delta = .08$), anxiety (B = .50, SE = .16, $p < .01$, adjusted $R^2 = .29$, $R^2 \Delta = .02$), ADHD (B = .28, SE = .07, $p < .001$, adjusted $R^2 = .32$, $R^2 \Delta = .03$) and ODD symptoms (B = .16, SE = .05, $p < .01$, adjusted $R^2 = .27$, $R^2 \Delta = .02$). Next, nonlinear relationships between the number of predictors and age 6 symptoms were explored by adding polynomial terms to the model. When the quadratic risk variable was added to each model, the effects were not significant for any of the symptom scales.

Discussion

This is the largest known study to examine the stability of specific emotional and behavioral problems in a community sample of preschoolers using a comprehensive diagnostic interview and a prospective longitudinal design. Psychopathology was assessed at two times points: when children were age 3 and again when they were age 6. In addition, we examined child, family, and life stress predictors of continuity. Overall rates of disorders were similar at age 3 and age 6 and there were no significant differences in the patterns of concurrent comorbidity among disorders at ages 3 and 6. There was significant homotypic continuity between age 3 and age 6 anxiety, ADHD, and ODD, and heterotypic continuity between depression and anxiety, depression and ODD, anxiety and ODD, and ADHD and ODD. Finally, predictors of continuity of psychopathology from age 3 to age 6 included variables from each domain.

Associations with Demographic Variables

Several associations emerged between demographic variables and the age 3 and age 6 PAPA diagnoses and symptom scales. At age 3, significant associations with psychopathology were found for non-white race, younger fathers' age, lower parental education and non-married

status. At age 6, significant associations with psychopathology were found for non-white race, male sex, older child age, and lower parental education and non-married status. The results of the study were identical when controlling for these demographic associations. The results suggest a coherent pattern of risk for children with certain sociodemographic profiles (i.e., non-white race, less parental education, unmarried parents).

Some interview studies with older children (Carter, Wagmiller, Gray, McCarthy, Horwitz, & Briggs-Gowan, 2010; Costello et al., 1996) and those using checklist measures in preschoolers (Campbell, 1995; Gadow et al., 2001) suggest that demographic variables such as minority status, male sex, and less parental education are associated with emotional and behavioral problems in children. To the limited extent that preschool researchers have examined demographic correlates in relation to specific disorders assessed with a diagnostic interview, few associations have been found, with the exception that boys were more likely to be diagnosed with attention-deficit/hyperactivity disorder than girls (Egger & Angold, 2006a; Lavigne et al., 2009). This finding was not observed in this study: more boys met criteria for ADHD than girls at age 3 (boys n = 8/11) and age 6 (boys n = 14/25), but these differences were not statistically significant at either assessment, X^2 (1, N = 462) = 1.57, p = .21 and X^2 (1, N = 462) = 0.04, p = .85, respectively.

Rates of Diagnoses and Levels of Symptom Scales

We found that over a quarter of the sample met criteria for any diagnosis at both age 3 and age 6. At age 3, the most prevalent disorders were ODD, specific phobia, separation anxiety disorder; at age 6, the most prevalent disorders were ODD, specific phobia, and any depression. 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 cross-sectional studies with samples of non-referred preschoolers (Earls, 1982; Egger et al., 2006a; Keenan et al., 1997; Lavigne et al., 1996, 2009). However, we assessed a greater number of emotional disorders than other studies, hence it makes sense that higher rates were observed. There are no known comparable studies assessing diagnoses from age 3 to age 6, but prevalence studies of representative samples of school-age children from the community report that about 1 in 5 children meet criteria for a psychiatric disorder, which is consistent with this study (Carter, et al., 2010; Costello et al., 2003),

The rates of diagnoses and mean levels of dimensional symptom scale scores for emotional and behavioral disorders in 6-year olds were compared to those found at age 3. Out of the ten disorders assessed, there was a significant increase in rates for two disorders (depression/dysthymia and ADHD), a decrease for 1 disorder (GAD), and no significant difference for seven disorders (depression NOS, specific phobia, separation anxiety disorder, social phobia, agoraphobia, selective mutism, and ODD) from age 3 to age 6. Given that no other studies have assessed diagnoses in preschoolers from age 3 to age 6, we cannot compare these rates to other samples. Of the four groups of dimensional symptom scales scores, the rates of depressive, anxiety, and ADHD symptoms increased from age 3 to age 6, whereas there was no change in the rates of ODD symptoms.

Similar to our findings, previous research suggests that depressive symptoms increase from age 4 to 8 (Colder, Mott, & Berman, 2002) and that depression is diagnosed more often in older rather than younger preschool-aged children (Luby et al., 2002; 2009). The increase in the rate of depression may reflect children's growing ability to vocalize their distress, which would raise parents' awareness of these symptoms at age 6 compared to age 3. This increase may also reflect an actual change in the rate of depression as the children transition to school-age with

increasing performance demands as well as a growing tendency to compare themselves to others, perhaps less favorably (Cole, Jacquez, & Maschman, 2001)[1]. The increase in rates of ADHD diagnoses and symptoms is consistent with other research (Egger, Kondo, & Angold, 2006b) and may reflect that the symptoms are more impairing, and therefore easier to recognize as children transition to formal schooling, requiring them to function in increasingly demanding social and academic contexts and maintain greater control over their behavior. Finally, the reason for the decrease in the rate of GAD is less clear, and there is very little data on GAD in preschoolers to clarify this finding (Kertz & Woodruff-Borden, 2011). The age 3 rate is somewhat similar to the rate found in a PAPA test-retest study with 2- to 5-year-old children in which rates of GAD decreased significantly from the first to the second assessment and 2.4% at the second assessment one week later (Egger et al., 2006a). These data are inconsistent with developmental research on worries, which suggests that the occurrence of children's worries increase with age (Muris, Merckelbach, Gadet, & Moulaert, 2000; Strauss, Lease, Last, & Francis, 1988; Vasey, Crinc, & Carter, 1994), though some particular areas of concern (e.g., physical well-being, imaginary creatures) seem to diminish over time whereas others (e.g., performance, social evaluation) increase over time. These findings may reflect changes in cognitive development from preschool to school age, where the focus of thoughts changes from concrete and immediate issues to more inferential and anticipatory thoughts. However, given the lack of studies in preschoolers, it is difficult to know whether the lower rate found in this study at age 6 is more or less valid than that at age 3. It is possible that the developmentally normative inquisitive nature of younger children (i.e., asking frequent questions about a variety of domains) (Chouinard,

[1] In this study, depression was significantly associated with school status for both the diagnosis ($r = .09$, $p < .05$) and the symptom scale ($r = .14$, $p < .01$) such that children were more likely to meet criteria for depression and have higher depressive scale scores when they entered formal schooling. For the depressive symptom scale, school status remained significant while controlling for child's age.

2007; Franzier, Gelman, & Wellman, 2009) was perceived as worrying by parents. In addition, preschool-aged children are likely to spend more time with parents than school-aged children, so there may have more opportunities to ask parents questions at age 3 than at age 6. The importance of studying worry in young children has been highlighted (Egger et al., 2006a; Kertz & Woodruff-Borden, 2011) and these unclear findings underscore this need.

Homotypic Continuity of Psychopathology

There was evidence of homotypic continuity between age 3 and age 6 anxiety, ADHD, and ODD diagnoses, as well as between the 5 of the 6 individual anxiety disorders. Homotypic continuity was not found for depression or GAD diagnoses, which may reflect the small number of depression cases at age 3 and GAD at age 6. We observed homotypic continuity between each of the age 3 dimensional symptom scales and its corresponding age 6 symptom scale. Similar to some research in this area, where homotypic internalizing pathways were less stable than homotypic externalizing pathways (Briggs-Gowan et al., 2006; Egeland et al., 1990; Fischer et al., 1984; Lavigne et al., 1998; Mesman et al., 2001; Pihlakoski, et al., 2006), the homotypic continuity of depressive symptoms was lower than the other disorders (though it was only significantly different from the anxiety and ADHD scales). However, similar to other studies that did not find differences between internalizing and externalizing pathways (Keenan et al., 1998; Lavigne et al., 1999), there were no differences between the degree of homotypic continuity in anxiety, ADHD, and ODD symptoms.

There has been very little research examining the stability of specific disorders assessed with a diagnostic interview in community samples of preschoolers, so only limited comparisons to previous studies can be made. Our finding of homotypic continuity of depressive symptoms was consistent with a study that focused on continuity of depression in preschoolers (Luby et al.,

2009). However, we did not find evidence for homotypic continuity of the depression diagnosis as they did, but they over-sampled for symptoms of depression in their study (whereas there were very few depression diagnoses in our sample at age 3). Moderate stability has been found for anxiety symptoms for preschool-aged children (Mian et al., 2010) and older children (e.g., Bosquet & Egeland, 2006) but the majority of preschool studies examining anxiety use broad internalizing scales or diagnostic categories that include symptoms of both depression and anxiety (Keenan et al., 1998; Keiley et al., 2003; Lavigne et al., 1998; Mesman et al., 2001; Sterba et al, 2007). Similar to our findings, other studies have reported that preschoolers with ADHD (Harvey et al., 2009; Lahey et al., 2004) and ODD (Keenan et al., 2011; Speltz et al., 1999) diagnoses are likely to continue to meet criteria for the disorders through school age, though the magnitude of continuity varies considerably across these few studies, which may reflect differences between clinical and community samples.

Comorbidity Between Diagnoses and Symptom Scales

Similar to older youth and adults, considerable overlap was found between disorders at both assessments and the patterns of comorbidity and covariation at age 6 were very similar to those found at age 3. Moreover, the rates of comorbidity of specific diagnoses were not significantly different, although the cell sizes may have been too small to detect changes. Overall, the structure of psychopathology appears to be relatively stable from age 3 to 6, although structure was not formally tested.

There was a significant difference between the magnitudes of the correlations between depressive and anxiety symptoms at age 3 and age 6, suggesting that symptoms of depression and anxiety covaried at a higher rate at age 6 than at age 3. This finding may reflect that symptoms of depression and anxiety become less differentiated over time, the heterotypic

continuity between the symptoms, or the range of depressive symptoms was more restricted at age 3 compared to age 6.

Consistent with other studies that reported rates of comorbidity in preschoolers, there was considerable overlap between emotional and behavioral disorders and symptoms (Birmaher et al., 2009; Lavigne et al., 1996; Keenan et al., 1997). Only Lavigne and colleagues (2009) reported rates of comorbidity between among specific disorders. Similar to this study, they found a high degree of comorbidity between ODD and ADHD. They also found an association between the ADHD and depression diagnoses, which was only observed in this study at the age 6 assessment. However, they assessed very few internalizing disorders, so patterns of comorbidity with anxiety disorders cannot be compared. We found significant associations between depression and anxiety, suggesting that this pattern that is identified regularly in adults (e.g., (Kessler, Chiu, Demler, & Walters, 2005) is evident as early as the preschool period. However, consistent with previous research (Egger & Angold, 2006), the association between the depression and ODD diagnoses was even greater than the association between depression and anxiety at both age 3 and age 6 assessments. These data question the validity of separate disorder constructs and suggest more general difficulties with emotional and behavior regulation.

The finding that the ODD diagnosis and symptoms were highly comorbid with most other diagnostic categories and symptoms is consistent with previous research with preschool-aged children (Egger & Angold, 2006) and with longitudinal studies finding that oppositionality is an antecedent of virtually all forms of psychopathology in preschoolers (Lavigne et al., 1998) and adolescents and adults (Kim-Cohen, Caspi, Moffitt, Harrington, Milne, & Poulton, 2003; Nock, Kazdin, Hiripi, & Kessler, 2007). These findings might be explained by research in older children indicating that ODD includes several distinct components that have more specific

associations with other disorders both cross-sectionally (Stringaris & Goodman, 2009a) and longitudinally (Langbehn, Cadoret, Yates, Troughton, & Stewart, 1998; Stringaris, Cohen, Pine, & Leibenluft, 2009; Stringaris & Goodman, 2009b). 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 (Stringaris & Goodman, 2009b).

Heterotypic Continuity of Psychopathology

Heterotypic continuity was found between 6 of the 12 possible pairs of broad diagnostic categories, and 12 out of 48 possible pairs of disorders with each of the anxiety diagnoses. In addition, there was heterotypic continuity between 11 of the 12 possible pairs of symptom scales. The degree of continuity was largely similar across homotypic and heterotypic analyses, suggesting that there is both stability of diagnoses and symptoms and well as change in diagnostic status and symptom presentation over time. Interestingly, the magnitude of some associations increased after controlling for age 6 comorbidity, such as between age 3 depression and age 6 anxiety and age 3 depression and age 6 ODD. These results suggest that depression is more likely to predict the "pure" rather than comorbid forms of these disorders, and may also reflect diagnostic instability. Moreover, these findings underscore the robustness of this form of heterotypic continuity.

It appears that both depression and anxiety disorders predict the other. There is research to support child and adolescent depression predicting later anxiety (Fergusson & Woodward 2002; Kim-Cohen et al., 2003; Pine, Cohen, Gurley, Brook, & Ma, 1998) but the majority of data in adolescents and young adults suggest that anxiety tends to precede depression and may be a risk factor for developing depression (Burke, Loeber, Lahey, & Rathouz, 2005; Cole, Peeke,

Martin, Truglio, & Seroczynski, 1998; Essau, 2003; Orvaschel, Lewinsohn, & Seeley,1995; Pine, Cohen, & Brook, 2001; Rice et al., 2004; Wittchen, Beesdo, Bittner, & Goodwin, 2003; Wittchen, Kessler, Pfister, & Lieb, 2000). Given that there is relatively no research in the continuity of specific anxiety disorders and other psychopathology in preschoolers, this study provides preliminary evidence for the pathways between early depression and particular anxiety disorders.

Unlike Luby and colleagues (2009), we did not find that disruptive behavior disorders (ADHD and ODD) predicted later depression; they posited that having preschool disruptive behavior disorders is more impairing than having anxiety disorders that can be relatively common in this age group. However, we did find that symptoms of ADHD and ODD at age 3 predicted symptoms of depression at age 6.

The observed heterotypic pathways may reflect shared risk factors for these disorders or different expressions of similar processes (Rutter et al., 2006). These results points to the importance of better understanding the underlying phenomenology of behavior and changing phenotypes across development (Wakschlag et al., 2007).

Predictors of Age 6 Psychopathology

To examine predictors of the change in psychopathology from age 3 to age 6, three domains of predictors were assessed: child (co-occurring symptoms and temperament, both assessed at age 3), family (maternal psychopathology and observed parenting behavior, both assessed at age 3) and life stress (early stressors involving the child or immediate family members from the time the child was born until the age 3 interview and proximal stressors involving the child or immediate family members 12 months prior to the age 6 interview). A

number of unique predictors of change in symptoms from age 3 to age 6 emerged in each symptom domain.

Less parental education, unmarried parents, age 3 anxiety symptoms, maternal mood disorder, maternal anxiety disorder, and early stressors predicted an increase in depressive symptoms from age 3 to age 6. Children with unmarried parents with less education appear to be at risk for increasing depressive symptoms compared to children with married parents with more education. Our finding is consistent with cross-sectional research in which less parental education was associated with internalizing problems (Carter et al., 2010; Luby et al., 2009) However, in an older sample, sociodemographic variables, including marital status and education, were not associated with persistence of problems (Briggs-Gowan et al., 2003). Age 3 symptoms of anxiety predicted an increase in depressive symptoms. This pattern is consistent with data in adolescents and young adults suggesting that anxiety tends may be a risk factor for developing depression (Essau, 2003; Orvaschel et al., 1995; Pine et al., 2001; Rice et al., 2004; Wittchen et al., 2000; 2003), that co-occurring symptoms may be a marker for more severe psychopathology (Briggs-Gowan et al., 2003), and the heterotypic continuity between age 3 anxiety and age 6 depression identified in this study.

Both maternal mood and anxiety disorders were associated with increasing depressive symptoms. Maternal depression is a well-established, potent risk factor for depression in children (Beardslee, Versage, & Gladstone, 1998; Goodman & Gotlib, 2002), and maternal psychopathology has been found to predict depression and depressive symptoms in children (Ashford et al., 2008; Field, Lang, Martinez, Yando, Pickens, & Bendell, 1996; Luby et al., 2009; Phillips & O'Hara; Sterba et al., 2007a) and adolescents (Garber et al., 2002; Klein, Lewinsohn, Rohde, Seeley, & Olino, 2005; Olino, Klein, Lewinsohn, Rohde, & Seeley, 2010;

Rohde et al., 2005). This association may reflect greater genetic vulnerability, as well as an environmental stressor that contributes to child emotional and behavior problems (Goodman & Gotlib, 1999).

Finally, early stressors occurring between the child's birth and the age 3 assessment predicted an increase in depressive symptoms from age 3 to 6. Stressors have been found to predict increases and persistence of psychopathology in youth (Goodyer, 2001; Mesman & Koot, 2001) with some specificity found for depression (Karevold, Røysamb, Ystrom, & Mathiesen, 2009). Life stressors may strain the family system and limit coping and other resources that may have delayed or prevented symptoms in children (Birmaher et al., 2002; Compas et al., 2004; Grant et al., 2004; 2006; Goodyer, 2001). Parent and child behaviors may also contribute to the occurrence of life stressors via stress generation processes (Adrian & Hammen, 1993; Grant et al., 2004; Rudolph et al., 2000). However, proximal stressors did not predict age 6 symptoms, suggesting that if stress generation processes were occurring, they were more robust in the earlier part of the child's life. There is a large body of evidence to suggest that although stressors are a normative part of the human experience, repeated activation of neurobiological stress responses, particularly during key developmental periods, have lasting and, at times, permanent effects that increase risk for psychopathology (Gunnar & Quevedo, 2007).

Three predictors of anxiety symptoms emerged: Age 3 ODD symptoms, temperamental dysphoria, and maternal anxiety disorder predicted an increase in anxiety symptoms from age 3 to age 6. First, fewer ODD symptoms at age 3 predicted an increase in anxiety symptoms, likely reflecting that children who are more inhibited and reserved are at risk for anxiety (Biederman et al., 2001b). Moreover, this finding is interesting in light of research that suggests anxiety and

inhibition may reduce risk for later oppositional problems (Kerr, Tremblay, Pagani, & Vitaro, 1997; Loeber, Burke, Lahey, Winters, & Zera, 2003; Nock et al., 2007)

Second, a number of studies of children indicate that extreme temperament/personality traits are associated with poorer outcomes in a variety of psychological problems (Caspi et al., 1995; Johnson et al., 1999; Moffitt & Caspi, 2001). Although temperamental behavioral inhibition has been consistently linked to anxiety (Biederman et al., 2001b; Schwartz, Snidman, & Kagan, 1999), this study identified temperamental dysphoria as a unique predictor of increasing anxiety. This finding is consistent with research that suggests temperamental sadness and withdrawal can contribute to later anxiety (Nigg, 2006). Further, Mian and colleagues (2010) found that negative emotionality, which encompasses dysphoria, was more predictive of later anxiety than inhibition.

Finally, maternal anxiety disorder also predicted increasing anxiety symptoms, which is consistent with previous research that offspring of anxious parents are more likely to experience anxiety than offspring of parents who are not anxious (Beidel & Turner, 1997; Biederman, Faraone, Hirshfeld-Becker, Friedman, Robin, & Rosenbaum, 2001a). However, as described above, maternal anxiety was also associated with increasing depressive symptoms, suggesting a broader pattern of risk for internalizing problems.

Non-white race and child's age were associated with increasing symptoms of ADHD from age 3 to 6. In studies of older children, non-white children appear to have a greater number of risk factors (e.g., poverty, parental unemployment) that are associated with increased risk for psychopathology (Costello, Keeler, & Angold, 2001). Regarding age, research has suggested that symptoms of ADHD are more commonly present in older preschool-aged children (Egger et al., 2006b).

Finally, early stressors predicted an increase in ODD symptoms from age 3 to age 6, which is consistent with research that stressors during the preschool period predict later externalizing problems (Mesman & Koot, 2001). It is unclear why early stressors predicted increases in symptoms of depression and ODD, but were not associated with change in symptoms of anxiety or ADHD. It is possible that certain children exposed to early stressors are particularly vulnerable to experiencing emotion dysregulation, which links symptoms of ODD and depression (Stringaris & Goodman, 2009b). Given that irritability in childhood predicts mood and anxiety disorders in adulthood (Stringaris et al., 2009), its potential association with stressors is an important issue to address.

The effect of child sex, early stressors, and recent stressors on the predictor variables in relation to change in symptoms was examined in separate moderation analyses. There were no significant interactions with child sex or recent stress. There was a significant interaction between early stressors and maternal intrusiveness in predicting age 6 anxiety symptoms: maternal intrusiveness was associated with a reduction in anxiety in environments with lower levels of stress whereas intrusiveness was associated win an increase in anxiety in environments with higher levels of stress. Although intrusiveness is typically associated with negative outcomes for children, there is research to suggest that maternal intrusiveness decreases children's inhibition (Hayden et al., 2010; Park, Belsky, Putnam, & Crinc, 1997). Under certain circumstances (e.g., low stress, particular genetic profiles), maternal intrusiveness may be experienced as increased monitoring and involvement. Accordingly, Kagan (1994) has suggested that parental intrusiveness may encourage shy children to interact with others, which may help children shift their focus away from threat and promote positive social experiences, thereby decreasing anxiety (Fox, Henderson, Marshall, Nichols, & Ghera, 2005).

Finally, there was a significant association between the accumulation of predictors and an increase in symptoms for each symptom scale, suggesting that an increased number of risk factors is associated with increased psychological symptoms over time.

Taken together, these findings suggest that non-white race, less parental education, unmarried parents, child co-occurring symptoms, maternal anxiety and depression, and early stressful life events predict an increase in symptoms of psychopathology from age 3 to age 6. These data can provide useful prognostic information for clinicians and families by identifying subgroups of children who are in greatest need for early intervention and services.

Limitations

This study had several limitations. First, almost 15% of children could not be assessed at age 6, which may limit the generalizability of the findings. However, of all of the PAPA and demographic variables, participants and dropouts differed only on one variable: fewer children with a depression diagnosis at age 3 had a second assessment at age 6. Given that there was no evidence of attrition on any other age 3 PAPA or demographic variables, the degree of bias is likely to be fairly small.

Second, interviews were conducted by telephone at the age 3 assessment, whereas at the age 6 assessment parents were interviewed in person. This may have reduced the strength of some of the associations between the age 3 and age 6 variables. However, in epidemiological studies of adult and child psychopathology, telephone interviews are common, and concordance between telephone and face-to-face interviews is high (Lyneham & Rapee, 2005; Rohde et al., 1997; Sobin et al., 1993). Hence, any effects of using different methods of administration were probably small.

Third, we used the ECI screener for ADHD and ODD to reduce administration time for the first 60% of the sample at the age 3 assessment. 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. However, this probably introduced some imprecision in the calculation of dimensional scores, and therefore may have attenuated some of the links between age 3 ADHD and ODD symptom scales with age 6 outcomes.

Fourth, given the small number of cases of major depression/dysthymia, cases of depression NOS were included in the "any depression" category. There are few data on the relation between depression NOS and specific depression diagnoses, which may have introduced some heterogeneity in the depression category and reduced levels of continuity/stability.

Fifth, interrater reliability was assessed using a small (n = 21) number of interviews at the age 3 assessment, and the use of audiotapes at both assessments may produce high-end estimates compared to independent interviews.

Sixth, many analyses were conducted, particularly with demographic variables, so it is possible that some of these results may be attributable to chance.

Seventh, 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.

Eighth, the data on psychopathology were based solely on parent reports. In addition, mothers typically reported on both their children's, their own symptoms, and stressful life events, which may have inflated associations due to shared method variance. Indeed, the strongest predictors came from same informant who provided data on the dependent variables. Further, mothers' depression may bias reporting about their children's symptoms, increasing the levels of symptoms endorsed for their children (Boyle & Pickles, 1997; Youngstrom, Izard, & Ackerman, 1999). However, maternal depression can be associated with more accurate reporting; for example, Garber and colleagues (2002) found that reports by mothers with depression paralleled and confirmed their high-risk offspring reports of symptoms.

Finally, the sample was largely white and middle class. Although the sample mirrored the demographic characteristics of the region in which the study was conducted, the small number of children in racial/ethnic minority groups may have limited the power to detect additional 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.

Conclusions

This is the largest known study to examine the stability of a wide range of specific emotional and behavioral problems in a community sample of preschoolers using a comprehensive diagnostic interview and a prospective longitudinal design. In addition, multiple methods were employed to assess a variety of predictors of change. This study greatly improves upon previous research that was limited by the use of small, clinical samples, a focus on externalizing problems, and the use of symptom checklist measures.

Continued efforts to characterize the phenomenology of psychopathology in preschoolers are needed. These efforts should include establishing empirically-based cutoffs to distinguish

normative from clinically significant behavior in young children using developmental and clinical science approaches (Wakschlag et al., 2007), examining the structure of preschool psychopathology assessed with diagnostic interviews (Sterba, Egger, & Anogld, 2007), conducting person-oriented analyses to understand diversity in trajectories (Sterba et al., 2007; von Eye & Bergman, 2003), and continuing diagnostic assessment of specific emotional and behavioral problems into school-age, adolescence, and beyond to increase our understanding of the course of psychopathology.

These results suggest that the data (1) yield information about the developmental course and clinical significance of specific disorders; (2) can aid in identifying at-risk populations and guide decision-making regarding need for services and (3) should encourage the development of prevention and early intervention efforts targeting both emotional and behavioral problems and their developmental sequelae. There have been increasing efforts to provide psychological services for young children and their caregivers (e.g., Bell & Eyberg, 2002; Knapp, Ammen, Arstein-Kerslake, Poulsen, & Mastergeorge, 2007), and it is vital for this work to continue. This study provides an improved understanding of the course of psychopathology in preschoolers, which is a necessary step toward improving the identification, classification, and treatment of psychological problems in young children.

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Appendix

Table 1
Demographic Characteristics of the Study Sample

Demographic Variable	Age 3 assessment	Age 6 assessment
Child mean age: years (SD)	3.6 (0.3)	6.1 (0.4)
Mother mean age: years (SD)	36.1 (4.5)	38.6 (4.5)
Father mean age: years (SD)	38.3 (5.4)	40.8 (5.4)
Child sex: female % (*n*)	45.9 (212)	
Child race/ethnicity: % (*n*)		
White/non-Hispanic	86.8 (401)	
Hispanic	8.4 (39)	
Black/African-American	1.5 (7)	
Asian	2.0 (9)	
Other	1.3 (6)	
Interview respondents: % (*n*)		
Biological Mother	97.6 (451)	92.2 (426)
Biological Father	1.7 (8)	7.6 (35)
Both parents	0.2 (1)	0.0 (0)
Grandparent	0.4 (2)	0.2 (1)
Biological parents' marital status: % (*n*)		
Married	94.2 (435)	89.4 (413)
Divorced, separated, or widowed	1.9 (9)	6.9 (32)
Never married	3.9 (18)	3.7 (17)
Parents' education: % graduated college (*n*) [a]		

Mother	56.7 (258)	59.3 (245)
Father	46.7 (209)	47.8 (195)

[a]Note: At the age 3 assessment, 1.5% (*n* = 7) of the mothers and 3.0% (*n* = 14) of the fathers did not indicate their education level. At the age 6 assessment, 10.6% (*n* = 49) of the mothers and 11.7% (*n* = 54) of the fathers did not indicate their education level.

Table 2

Associations between Demographic Variables and PAPA Diagnoses and Symptom Scales

	Age 3 Diagnoses				Age 3 Symptom Scales			
	Depression	Anxiety	ADHD	ODD	Depression	Anxiety	ADHD	ODD
Race	.05	-.10*	.02	-.02	.00	-.05	-.04	-.04
Sex	-.07	-.04	-.06	-.07	-.03	-.05	-.06	-.04
Age 3:								
Age at PAPA	.00	.01	.02	.04	.05	-.01	.05	.01
Mother's Age	.02	-.05	-.04	-.01	-.09	.00	-.07	-.03
Father's Age	.01	-.06	-.07	-.05	-.11*	.02	-.12**	-.04
Parents' Education	-.05	-.12*	.08	-.02	-.13**	-.13**	-.01	-.02
Parents' marital status	-.13**	-.09	-.02	-.01	-.08	-.07	-.04	-.03
	Age 6 Diagnoses				Age 6 Symptom Scales			
	Depression	Anxiety	ADHD	ODD	Depression	Anxiety	ADHD	ODD
Race	-.11*	.08	-.08	-.17***	-.10*	-.04	-.15**	-.11*
Sex	.03	-.08	-.01	-.03	-.01	-.10*	-.06	-.07
Age 6:								
Age at PAPA	.07	.01	.09	.05	.07	.02	.10*	.04
Mother's Age	-.07	.02	-.04	.03	-.05	.04	-.04	.00
Father's Age	-.04	.03	-.05	-.01	-.01	.06	-.06	-.03
Parents' Education	-.10*	-.02	-.04	-.06	-.20***	-.08	-.05	-.10*
Parents' marital status	-.08	-.03	-.10*	.00	-.15***	-.02	-.12**	-.07

*$p < .05$; **$p < .01$; ***$p < .001$. *Note*. PAPA = Preschool Age Psychiatric Assessment. ADHD = Attention-deficit/hyperactivity disorder; ODD = Oppositional defiant disorder.

Table 3
Comparison of Rates at Age 3 and Age 6 [(%) (*n*) (95% CI)]

Disorder	Age 3 Rate	Age 6 Rate
Any diagnosis	27.5 *(127)* (23.5-31.9)	26.6 *(123)* (22.8-30.8)
Any Emotional Disorder	19.7 *(91)* (16.2-23.7)	18.8 (*87*) (15.5-22.7)
Any Depression	1.3 *(6)* (0.6-2.8)	5.4 (*25*) (3.7-7.9)
MDD/Dysthymia	0.4 *(2)* (0.1-1.6)	3.2 (*15*) (2.0-5.3)
Depression NOS	0.9 *(4)* (0.3-2.2)	2.2 (*10*) (1.2-3.9)
Any Anxiety Disorder	19.3 *(89)* (15.9-23.1)	15.6 *(72)* (12.6-19.2)
Specific phobia	9.5 *(44)* (7.2-12.5)	8.2 *(38)* (6.1-11.1)
Separation anxiety	5.6 *(26)* (3.9-8.1)	4.8 *(22)* (3.2-7.1)
Social phobia	3.7 *(17)* (2.3-5.8)	2.2 *(10)* (1.2-3.9)
GAD	3.9 *(18)* (2.5-6.1)	1.5 *(7)* (0.7-3.1)
Agoraphobia	3.2 *(15)* (2.0-5.3)	1.7 *(8)* (0.9-3.4)
Selective mutism	1.5 *(7)* (0.7-3.1)	0.6 *(3)* (.2-1.9)
Any Behavioral Disorder	11.0 *(51)* (8.4-14.3)	12.3 *(57)* (9.7-15.7)
ADHD	2.4 *(11)* (1.3-4.2)	5.4 *(25)* (3.7-7.9)
ODD	10.2 *(47)* (7.7-13.3)	8.9 *(41)* (6.6-11.8)
Two or more diagnoses	9.1 *(42)* (6.8-12.1)	8.9 *(41)* (6.6-11.8)

Note. *N* = 462. MDD = Major depressive disorder; NOS = Not otherwise specified; GAD = Generalized anxiety disorder; ADHD = Attention-deficit/hyperactivity disorder; ODD = Oppositional defiant disorder.

Table 4
McNemar's Tests Between Age 3 and Age 6 Diagnoses

Age 3 Disorder		Age 6 Disorder		
		Absent	Present	*p* value
Any Diagnosis	Absent	276	59	.79
	Present	63	64	
Any Emotional	Absent	319	52	.77
Disorder	Present	56	35	
Any Depression	Absent	431	25	**.00**
	Present	6	0	
MDD/Dysthymia	Absent	445	15	**.00**
	Present	2	0	
Depression NOS	Absent	448	10	.18
	Present	4	0	
Any Anxiety	Absent	331	42	.11
Disorder	Present	59	30	
Specific phobia	Absent	388	30	.54
	Present	36	8	
SAD	Absent	420	16	.62
	Present	20	6	
Social phobia	Absent	441	4	.12
	Present	11	6	

Age 3 Disorder		Age 6 Disorder		
		Absent	Present	*p* value
GAD	Absent	437	7	**.04**
	Present	18	0	
Agoraphobia	Absent	442	5	.14
	Present	12	3	
Selective mutism	Absent	453	2	.29
	Present	6	1	
Any Behavior	Absent	376	35	.53
Disorder	Present	29	22	
ADHD	Absent	431	20	**.01**
	Present	6	5	
	Absent	390	25	
ODD	Present	31	16	.50

Note. *p* values in **bold** signify a significant increase or decrease in rates from age 3 to age 6. MDD = Major depressive disorder; NOS = Not otherwise specified; SAD – Separation anxiety disorder; GAD = Generalized anxiety disorder; ADHD = Attention-deficit/hyperactivity disorder; ODD = Oppositional defiant disorder.

Table 5

Paired Samples t-tests Between Age 3 and Age 6 Symptom Scales

Scale	Age 3 Mean (SD)	Age 6 Mean (SD)	*t* statistic
Depression	1.93 (2.19)	4.15 (3.42)	15.02***
Anxiety	7.55 (6.34)	11.16 (8.90)	10.00***
ADHD	1.48 (3.73)	2.40 (3.82)	5.45***
ODD	2.30 (3.32)	2.50 (2.81)	1.42

Note. ***$p < .001$. SD = standard deviation; ADHD = Attention-deficit/hyperactivity disorder; ODD = Oppositional defiant disorder.

Table 6

Logistic Regression Analyses with Age 3 Diagnoses Predicting Age 6 Diagnoses: Odds Ratios (95% Confidence Intervals)

	Age 6			
Age 3:	Depression	Anxiety	ADHD	ODD
Depression	--	5.61*(1.11-28.36)	3.60 (.41-32.04)	5.34† (.95-30.12)
	--	6.31*(1.24-31.98)	4.59 (.51-41.34)	7.20*(1.26-41.00)
Anxiety	2.51*(1.07-5.88)	4.01***(2.32-6.91)	1.35 (.52-3.48)	2.39* (1.20-4.78)
	1.80 (.73-4.46)	--	n/a	n/a
ADHD	1.78 (.22-14.48)	.54 (.07-4.25)	17.96***(5.05-63.86)	9.61***(2.80-33.02)
	.58 (.06-65.67)	n/a	--	5.07* (1.28-20.10)
ODD	2.35 (.83-6.59)	1.32 (.61-2.87)	7.21***(3.03-17.17)	8.05***(3.90-16.65)
	.89 (.27-2.92)	n/a	4.57**(1.75-11.89)	--

†$p < .10$; *$p < .05$; **p , .01; ***$p < .001$. *Note.* The homotypic analysis could not be not computed for depression because there were no age 3 cases that remained cases at age 6. The second row of values reflects analyses conducted to control for concurrent significant ($p < .05$) comorbidity in the heterotypic analyses. n/a reflects non-significant comorbid associations in the concurrent age 6 bivariate logistic regression analyses.

Table 7

Bivariate Correlations Between Age 3 and Age 6 Symptom Scales

	Age 6			
Age 3	Depression	Anxiety	ADHD	ODD
Depression	.43***	.29***	.25***	.34***
	--	.06	.10*	.15**
Anxiety	.36***	.53***	.09	.21***
	.08†	--	-.05	.09*
ADHD	.22***	.14**	.55***	.32***
	.00	.01	--	.11*
ODD	.30***	.09*	.35***	.50***
	.05	-.04	.16**	--

$^{\dagger}p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$. *Note*. The second row of values reflects analyses conducted to control for concurrent age 6 comorbidity in the heterotypic analyses.

Table 8

Rates of Concurrent Comorbidity at Age 3 and Age 6 (%) (n)

PAPA diagnosis	Age 3	Age 6
Depression and Anxiety	.87 (4)	2.16 (10)
Depression and ADHD	.22 (1)	1.30 (6)
Depression and ODD	.87 (4)	2.38 (11)
Anxiety and ADHD	.65 (3)	1.08 (5)
Anxiety and ODD	3.03 (14)	1.73 (8)
ODD and ADHD	1.52 (7)	1.95 (9)

Note. ADHD = Attention-deficit/hyperactivity disorder; ODD = Oppositional defiant disorder.

Table 9

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

	Depression	Anxiety	ADHD	ODD
		Age 3		
Depression	--	6.58*(1.12-38.60)	1.54 (0.13-19.12)	14.34**(2.27-90.58)
Anxiety	8.73*(1.57-48.44)	--	1.01 (0.23-4.47)	1.61 (0.77-3.38)
ADHD	8.92 (0.95-83.51)	1.59 (0.41-6.12)	--	16.85***(4.56-62.24)
ODD	19.21** (3.42-107.94)	1.92 (0.98-3.77)	17.98***(5.05-64.07)	--
		Age 6		
Depression	--	4.13** (1.63-10.42)	3.44*(1.02-11.65)	8.55***(3.28-22.33)
Anxiety	4.03**(1.73-9.38)	--	1.00 (0.33-3.00)	.87 (0.35-2.20)
ADHD	6.95**(2.49-19.39)	1.38 (.50-3.81)	--	5.02**(1.88-13.37)
ODD	10.66***(4.46-25.51)	1.35 (.60-3.06)	7.12***(2.92-17.38)	--

*$p < .05$; **$p < .01$; ***$p < .001$;Note: Odds ratios to the left of the diagonal reflect the associations without controlling for other diagnoses. Odds ratios to the right of the diagonal reflect analyses conducted controlling for all other diagnoses. Depression = any Depression diagnosis; Anxiety = any Anxiety diagnosis; PAPA = Preschool Age Psychiatric Assessment; ADHD = Attention-Deficit/Hyperactivity Disorder; ODD = Oppositional Defiant Disorder.

Table 10

Concurrent Correlations Between Symptom Scales

	Depression	Anxiety	ADHD	ODD
			Age 3	
Depression	--	.42***	.16***	.42***
Anxiety	.49***	--	.04	-.04
ADHD	.40***	.22***	--	.33***
ODD	.55***	.25***	.47***	--
			Age 6	
Depression	--	.52***	.17***	.39***
Anxiety	.57***	--	.05	-.08
ADHD	.41***	.25***	--	.30***
ODD	.52***	.25***	.44***	--

*$p < .05$; **$p < .01$; ***$p < .001$; Note: Correlations to the left of the diagonal reflect the associations without controlling for other symptom scales. Correlations to the right of the diagonal reflect analyses conducted controlling for all other symptom scales. PAPA = Preschool Age Psychiatric Assessment; ADHD = Attention-Deficit/Hyperactivity Disorder; ODD = Oppositional Defiant Disorder.

Table 11

Zero-order Correlations Among Age 3 and Age 6 PAPA Symptom Scales and Age 3 Predictor Variables

	9	10	11	12	13	14	15	16	17	18	19	20
1. Depression - T1	.07	.06	-.04	.04	.18*	.20*	.13*	-.10*	.06	.16*	.17*	.09
2. Anxiety - T1	.07	.16*	-.20*	-.01	.15*	.16*	.11*	-.05	.01	.05	.04	.06
3. ADHD - T1	-.02	-.12*	-.05	.17*	.08	13*	-.03	-.08	.05	.19*	.24*	.11*
4. ODD - T1	.06	-.02	-.08	.23*	.10*	.16*	.03	-.10*	.05	.15*	.20*	.08
5. Depression - T2	.11*	.07	.00	.09	.25*	.25*	.13*	-.11*	.05	.11*	.25*	.17*
6. Anxiety - T2	.17*	.14*	-.10*	.07	.14*	.21*	.11*	-.03	-.01	.05	.06	.07
7. ADHD - T2	.09	-.04	-.06	.21*	.10*	.09	.05	-.12*	.07	.15*	.20*	.04
8. ODD - T2	.05	-.01	-.06	.18*	.09*	.09*	.01	-.14*	.06	.12*	.21*	.02
9. Dysphoria	--	.25*	-.04	.32*	.11*	.02	.06	-.13*	.05	.09*	.05	.02
10.Fear/inhihibition		--	-.08	-.03	.15*	.00	.11*	-.02	.04	.06	.01	.00
11.Exuberance			--	-.05	-.02	.01	.03	.12*	-.02	-.04	-.03	-.05
12.Disinhibition				--	.03	.07	-.02	-.15*	.19*	.18*	-.04	-.03
13.M Depression					--	.28*	.18*	-.08	.01	.07	.18*	.13*
14.M Anxiety						--	.17*	.04	.08	-.02	.06	.10*
15.M Substance							--	-.04	.01	.10*	.12*	.05
16. M Supportive Presence								--	-.31*	-.66*	-.10*	-.09*
17. M Intrusiveness									--	.42*	-.02	.09
18. M Hostility										--	.06	.05
19. Early Stressors											--	.17*
20.Recent Stressors												--

Note. *$p < .05$. T1 = age 3, time 1 assessment; T2 = age 6, time 2 assessment. ADHD = Attention-deficit/hyperactivity disorder; ODD = Oppositional defiant disorder; M = maternal. No correlations are presented between variables 1-8 given that they repeated data presented in earlier tables.

Table 12
Simultaneous Regressions with Child, Family, and Life Stress Variables as the Independent Variables (IVs) and Age 6 PAPA symptom scales as the Criterion Variables

IV	B	*SE*	*p*	*sr*
DV: Age 6 Depression scale				
Age 3 Depression scale	.36	.08	**.00**	.18
Race	-.68	.42	.11	-.07
Parental Education	-.71	.32	**.03**	-.09
Parental marital status	-.98	.48	**.04**	-.09
Anxiety scale	.09	.03	**.00**	.15
ADHD scale	.00	.04	.93	.00
ODD scale	.07	.06	.24	.05
Dysphoria	-.05	.17	76	-.01
Fear/inhibition	.08	.14	.59	.02
Exuberance	.24	.15	.11	.07
Disinhibition	.13	.16	.41	.03
Maternal Mood Disorder	.79	.32	**.01**	.10
Maternal Anxiety Disorder	.72	.32	**.02**	.10
Maternal Substance Use Disorder	.07	.34	.84	.01
Maternal Supportive Presence	-.14	.33	.68	-.02
Maternal Intrusiveness	-.17	.36	.63	-.02
Maternal Hostility	.15	.56	.79	.01
Early stressors	.14	.06	**.01**	.10
Recent stressors	.10	.08	.23	.05

IV	B	*SE*	*p*	*sr*
DV: Age 6 Anxiety scale				
Age 3 Anxiety scale	.67	.07	**.00**	.40
Sex	-1.38	.76	.07	-.07
Parental Education	.49	.82	.55	.02
Depression scale	.24	.22	.29	.04
ADHD scale	.11	.11	.33	.04
ODD scale	-.30	.14	**.03**	-.09
Dysphoria	1.05	.44	**.02**	.09
Fear/inhibition	.38	.38	.32	.04
Exuberance	.08	.39	.85	.01
Disinhibition	.19	.43	.66	.02
Maternal Mood Disorder	.21	.82	.80	.01
Maternal Anxiety Disorder	2.35	.81	**.00**	.11
Maternal Substance Use Disorder	.39	.88	.66	.02
Maternal Supportive Presence	.27	.85	.75	.01
Maternal Intrusiveness	-1.02	.93	.27	-.04
Maternal Hostility	1.10	1.47	.46	.03
Early stressors	.06	.14	.67	.02
Recent stressors	.21	.21	.34	.04
DV: Age 6 ADHD scale				
Age 3 ADHD scale	.51	.05	**.00**	.40
Race	-1.38	.47	**.00**	-.12

IV	B	*SE*	*p*	*sr*
Child's Age at Age 6 PAPA	1.31	.40	**.00**	.13
Parental Marital Status	-.63	.53	.23	-.04
Depression scale	.08	.09	.43	.03
Anxiety scale	-.05	.03	.08	-.07
ODD scale	.08	.06	.18	.05
Dysphoria	-.11	.19	.55	-.02
Fear/inhibition	.07	.16	.65	.02
Exuberance	-.24	.17	.15	-.06
Disinhibition	.33	.18	.07	.07
Maternal Mood Disorder	.54	.36	.15	.06
Maternal Anxiety Disorder	-.02	.35	.95	.00
Maternal Substance Use Disorder	.65	.38	.09	.07
Maternal Supportive Presence	-.44	.37	.23	-.05
Maternal Intrusiveness	-.08	.40	.93	.00
Maternal Hostility	-.39	.63	.53	-.03
Early stressors	.02	.06	.81	.01
Recent stressors	-.08	.09	.38	-.04
DV: Age 6 ODD scale				
Age 3 ODD scale	.33	.04	**.00**	.30
Race	-.50	.34	.15	-.06
Parental Education	-.32	.26	.22	-.05
Depression scale	.07	.07	.33	.04

IV	B	*SE*	*p*	*sr*
Anxiety scale	.03	.02	.18	.05
ADHD scale	.05	.04	.16	.06
Dysphoria	-.07	.14	.64	-.02
Fear/inhibition	.01	.12	.96	.00
Exuberance	.01	.12	.18	.00
Disinhibition	.18	.13	.18	.06
Maternal Mood Disorder	.14	.26	.58	.02
Maternal Anxiety Disorder	-.04	.26	.89	-.01
Maternal Substance Use Disorder	-.09	.28	.75	-.01
Maternal Supportive Presence	-.39	.27	.15	-.06
Maternal Intrusiveness	.06	.30	.84	.01
Maternal Hostility	-.40	.47	.39	-.03
Early stressors	.12	.05	**.01**	.10
Recent stressors	-.10	.09	.13	-.06

Note. Significant *p* values in **bold.** PAPA = Preschool Age Psychiatric Assessment; ADHD = Attention-Deficit/Hyperactivity Disorder symptom scale; ODD = Oppositional Defiant Disorder symptom scale; *SE* = standard error; *sr* = semi-partial correlation coefficient *r* (effect size)

Figure 1.
Interaction between early stressors and maternal intrusiveness in predicting change in anxiety symptoms.