2009

A Meta-Analytical Study of Pediatric Bipolar Disorder: Symptomology and Comorbidity

April Walter

A META-ANALYTICAL STUDY OF PEDIATRIC BIPOLAR DISORDER: SYMPTOMATOLOGY AND COMORBIDITY

A Dissertation

Presented to the Faculty of

Antioch University Seattle

Seattle, WA.

In Partial Fulfillment

of the Requirements of the Degree of

Doctor of Psychology

By

April Walter

September 2009

A META-ANALYTICAL STUDY OF PEDIATRIC BIPOLAR DISORDER:

SYMPTOMATOLOGY AND COMORBIDITY

This Dissertation, by April Walter, has
been approved by the committee members signed below
who recommend that it be accepted by the faculty of the
Antioch University Seattle, WA.
in partial fulfillment of requirements of the degree of

DOCTOR OF PSYCHOLOGY

Clinical Dissertation Committee:

_____
Mary Wieneke, Ph. D.
Co-Chairperson

_____
Benny Martin, Ph. D.
Co-Chairperson

_____
Molly Reid, Ph. D.
Committee Member

_____
Date

ABSTRACT

A META-ANALYTICAL STUDY OF PEDIATRIC BIPOLAR DISORDER: SYMPTOMATOLOGY AND COMORBIDITY

APRIL WALTER

Antioch University Seattle

Seattle, WA.

A meta-analysis approach was employed to research the symptomatology and comorbidity of pediatric bipolar disorder (PBD). This approach was chosen due to the wide range of previously published research results and the limited size of the populations investigated. Database searches of peer-reviewed empirical research identified 861 journal articles published on the topic of pediatric bipolar disorder over the last 49 years. Fifty-four articles, with a total subject pool of 10,318, met specific inclusion criteria, which included being a quantitative study using standardized mean difference, correlation coefficient, or odds-ratio statistics. Fifteen separate meta-analyses were used to determine specificity regarding: differences reported in the literature between pediatric and adult BPD, age of onset of PBD, comorbidity of cardinal symptoms of mania (euphoria, grandiosity, irritability), prevalence of diagnostic type (PBD-I, PBD-II, PBD-NOS), cycling type (chronic, rapid, episodic), and comorbidity with other often overlapping disorders (attention deficit hyperactivity disorder, oppositional defiant disorder and conduct disorder, major depression, and autism spectrum disorders. All but three of the meta-analyses (chronic cycling, ODD, and MD comorbidity) resulted in significant findings. All of the PBD diagnoses and most of the

comorbid disorders studied were highly correlated with much symptom overlap. Further research is needed to more accurately determine what constitutes pediatric bipolar disorder.

Table of Contents

Dedication Page

This dissertation is dedicated to my wonderful family who has encouraged me throughout my academic career. With special thanks to my husband, Shelly and son, Adam for all of their help and support during my last year of my doctoral program. In addition, I dedicate this dissertation to my spectacular dissertation committee members, Benny, Mary, and Molly, who have mentored me throughout my doctoral program. You made my academic experience much richer than I could have asked for.

List of Tables

A Meta-analytical Study of Pediatric Bipolar Disorder: Symptomatology and Comorbidity

The presence of and debate over manic depressive illness have been noted as far back as the 19th century (Esquirol, 1845; Kyte, Carlson, & Goodyer, 2006). During the early 20th century Kraeplin's 1921 monograph on manic depressive insanity (Carlson, 2005; Carlson & Meyer, 2006), created a greater awareness of manic depression. Kraeplin recognized that symptoms of severe depression subsided and continued to reoccur in hundreds of patients (Carlson & Meyer, 2006). Kreaplin found symptoms characteristic of depression, including sadness, lack of interest, low self-esteem, psychomotor slowing, excessive sleeping, irritability, and fatigue (Carlson & Meyer, 2006). In addition, some of Kreplin's patients displayed opposite-symptom episodes, including euphoric moods, interests in many things, an inflated self-esteem, activation, excessive energy, irritability, and a decreased need for sleep (Carlson & Meyer, 2006). The symptom of irritability appeared in both the depressive and the manic mood states (Carlson & Meyer, 2006). Kreplin termed such episodes as manic and depressive, coining the term *manic depressive insanity* (since named bipolar disorder) (Carlson & Meyer, 2006).

Kraeplin's findings activated child psychiatrists to reassess their clients for manic depressive insanity. In the 1920s and 1930s child psychiatrists began recognizing patients displaying manic depressive insanity. Although seen rarely, it was found primarily in adolescents with depression identified in other family members (Carlson & Meyer, 2006). In addition, Kraeplin's work inspired research exploring manic depressive cases in hundreds of state hospitals. These latter findings suggested that manic depressive insanity

existed in children, with a greater prevalence in adolescents who displayed depressive symptoms.

During the 1950s, a series of papers questioned the validity of manic depressive insanity. In the journal, *The Nervous Child,* a number of articles appeared acknowledging the presence of manic depression in children. These publications noted that the phenomenon usually arose in adolescents with depression being the primary episode (Carlson, 2005; Carlson & Meyer, 2006). The well-known accounts of Barton-Hall's private practice recognized that the condition of manic depression had a prevalence rate of 6 out of 1,000 children, with the majority being adolescents with depression as the primary complaint (Carlson, 2005; Carlson & Meyer, 2006; Kyte, Carlson, & Goodyer, 2006). This account supported Kraeplin's deductions made early in the 20th century. Further studies in the 1950s suggested a possible *alternate form* reflecting more typical childhood behavioral psychopathology (Carlson, 2005; Carlson & Meyer, 2006). However, manic depressive insanity became gentrified during the 1950s and 1960s, when its name changed to manic-depressive illness at its inclusion into the *Diagnostic and Statistical Manual of Mental Disorders*, (II) (American Psychiatric Association, 1968; Carlson & Meyer, 2006,).

Anthony and Scott (1960) reviewed literature on pediatric bipolar disorder. Their investigation primarily looked for strictly defined manic depressive psychosis in preadolescents (Carlson, 2005; Carlson & Meyer, 2006). Within their definition of manic depressive psychosis, they screened for euphoric episodes and activated mania; followed by severe, psychomotor-retarded depression; followed by subsequent euthymia (Carlson, 2005). From their search, Anthony and Scott found manic depressive psychosis to occur

rarely in children under the age of 11 (Carlson, 2005; Carlson & Meyer, 2006). However, they did not dispute that a substantial number of children under the age of 11 had symptoms of mania that appeared to be superimposed along with diverse developmental and psychiatric conditions (Carlson, 2005). Early studies documenting the success of lithium on treating pediatric bipolar disorder and subsequent research of the 1960s supported these findings (Carlson & Meyer, 2006; Kyte, Carlson, & Goodyer, 2006).

The next major exploration of mania occurred late in the 1970s by two neurologists, Weinberg and Brumback. They published modifying recommendations for diagnosing manic depression in children (Carlson, 2005; Kyte, Carlson, & Goodyer, 2006). This occurred simultaneously with Feighner's publication of diagnostic criteria recommendations for adult bipolar disorder. Unfortunately, Wieberg's and Brumback's recommendations were dismissed because their sample participants had already been diagnosed as learning-disabled and very hyperactive (Carlson, 2005; Kyte, et al., 2006). Of note, in 1978, Carlson and Strober reported that one of the reasons manic depression was rare, especially in adolescents, was that it was misdiagnosed as schizophrenia (Carlson, 2005; Carlson & Strober, 1978). Youngerman's and Canino's (1978) findings announced that same year, noted several observations:

> (a) classic manic depression appears to be rare in young people; (b) classic manic depression is more rare in children than adolescents; (c) there has been a long-standing interest in trying to find a symptom constellation especially in younger children that would be lithium-responsive; and (d) children with behavior problems, even with a positive family history, had such a poor response to lithium

> that it probably disinclined clinicians to do more studies. (Carlson & Meyer, 2006). (p. 944)

Throughout history, a number of researchers have substantiated manic depressive illness in children. Nonetheless, further controversy exists and needs to be considered.

Why Study Pediatric Bipolar Disorder?

Pediatric bipolar disorder (PBD) remains shrouded in controversies. These include questions regarding the existence and prevalence of PBD, the diagnostic criteria used for PBD, and the occurrence of comorbidity of PBD. For the purpose of this study, the parameters of the term *pediatric* include all people under the age of 20. Bipolar disorder (BD) is defined as a major mood disorder manifested via cycling depressive and manic episodes (Reber & Reber, 2003). Despite increased research on PBD during recent years, little consensus exists on the disorder's symptomatology and comorbidity. The existence of PBD has been put in question (Danielyan, Pathak, Kowatch, Arszman, & Johns, 2007). It is estimated that 26% of adults with bipolar disorder reported onset prior to the age of 13 (Post, Findling, & Kowatch, 2006). In addition, research has found that children with bipolar parents carry a 2.7 times greater risk for a mental disorder and a four times greater risk of developing a mood disorder (Carlson, 2002). A dearth of diagnostic guidance exists in the *DSM-IV-TR* (2000) on pediatric bipolar symptoms with the exception of suggested use of modified adult diagnostic criteria (Mash & Barkley, 2007). Many of the symptoms of pediatric bipolar disorder are similar to other disorders, such as, attention deficit hyperactivity disorder, conduct disorder, oppositional defiant

disorder, major depression, and autism spectrum disorder. The overlapping symptoms of these disorders add to the controversy of PBD (Kim & Milklowitz, 2002).

PBD Existence and Prevalence Controversy

The diagnosis of bipolar disorder among children and adolescents has increased in the last decade (Post, Findling, & Kowatch, 2006). However, no consensus has been reached on the prevalence rates given the few, if any, large-scale studies (Coyle, et al., 2003). Some have reported that pediatric bipolar disorder rates have been on the rise for some time. Lange and McGinnis (2002) reviewed studies that documented an increase incidence and earlier age of onset of PBD in every birth cohort since World War I (Geller & Luby, 1997; Post, Findling, & Kowatch, 2006). PBD, although once thought to be rare, had an estimated prevalence in 1997, of 1 out of 20,000 children (Miller, 2007). By 2007, that estimate increased with PBD symptoms appearing in 1 out of every 200 children (Miller, 2007). Another study estimated an increase of 65.4% in PBD diagnosis between 1995 and 2000 (Harpaz-Rotem & Roseheck, 2004). The current adult diagnostic prevalence rates are 4.4% of the adult population having a bipolar diagnosis, with 22.5% diagnosed with BD-I, 22.5% with BD-II, and 55% with BD-NOS (Merikangas, et al., 2007).

These statistics appear remarkable. However, other studies have stated that the prevalence of PBD remains congruent with the rates of adults with bipolar disorder with an estimated prevalence between 0.1% to 1.2% (Carlson, 2002; Coyle, et al., 2003; Geller & Luby, 1997; Youngstrom, Findling, & Feeny, 2004). While these reports claim to have converging evidence to support PBD being a common, highly morbid psychiatric

disorder (Wozniak, et al., 2005) other studies report a paucity of *known* precise prevalence rates for PBD (Coyle, et al., 2003; Youngstrom, et al., 2004). Youngstrom, et al. (2004) reported that the published prevalence rates of PBD might be substantially underestimated and bear little resemblance to what clinicians actually see in their practice.

Converging evidence demonstrates that PBD is a common, highly morbid pediatric psychiatric disorder (Biederman, et al., 2004; Carlson & Kelly, 1998; Faedda, Baldessarini, Glovinsky, & Austin, 2004; Findling, et al., 2001; Geller, et al. 2001; Geller, Tillman, Craney, & Bolhofner, 2004; Geller, et al., 2000; Leibenluft, Charney, Towbin, Bhangoo, & Pine, 2003; Strober, et al., 1995; Wozniak, et al, 1995; Youngstrom, Findling, & Feeny, 2004). Currently, 100,000 youths take bipolar medication in the United States (Mash & Barkley, 2007). Even with that substantial number, concern exists about both its underdiagnosis and overdiagnosis (Geller & Luby, 1997). In either case, effects on patients and their families, and impacts on the profession and society potentiate critical ramifications for both extremes. An estimated 70% of children and adolescents with serious mood disorders either are underdiagnosed or treated inappropriately (Coyle, et al., 2003). For advancement in the field of PBD to continue, more research efforts need to occur (Coyle, et al.).

Pediatric Bipolar Disorder Diagnostic Controversies

Diagnosing pediatric bipolar disorder has been generating much controversy and attention (Kluger & Song, 2002; Papolos, 1999; Youngstrom, Findling, & Feeny, 2004). Considerable controversy surrounds the *DSM-IV-TR* diagnostic criteria which clinicians

are expected to use. Current practice expects clinicians to diagnose children and adolescents using the non-adjusted *DSM-IV-TR* adult bipolar disorder diagnostic criteria (Carlson & Meyer, 2006;Youngstrom, et al., 2004). Coyle and colleagues (2003) wrote, "Although the *DSM-IV-TR* provides explicit diagnostic criteria for bipolar disorder in adults, these criteria may not be broadly applicable to children and adolescents (p.1497)." The debate continues over the relationship between pediatric and adult bipolar disorder symptoms (Miller, 2007). No template exists for pediatric bipolar disorder nor a consensus on the presentation this disorder (Carlson & Meyer, 2006).

Although the same diagnostic criteria apply to three age groups (children, adolescents, and adults), important developmental differences in presentation among these complicate the recognition of this disorder (Youngstrom, Findling, & Feeny, 2004). Uncertainty regarding these differences clouds the need for ascertaining the fundamentals to confirm a diagnosis (Wozniak, et al., 2005). Arriving at such solidifying fundamentals requires agreement on how far the profession can bend the current criteria to fit the needs of children and adolescents (Carlson, 2005). Limited exposure that most clinicians have to PBD patients and the clinicians' uncertainty about the relevance and presentation of the diagnostic criteria further confuse the issue (Kim & Miklowitz, 2002; Staton, Odden, & Volness, 2004). The main symptom criteria in question are: mania, depression, irritability, as well as duration and cycling patterns.

As cited by Carlson (2005), Glovinsky performed an in-depth literature review in 2002, from which he found case reports of children (in contrast to adolescents) with the same constellation of behaviors currently being called *mania*. Discrete episodes of mania have been considered the hallmark feature of bipolar disorder in adults (Coyle, et al.,

2003). However, in PBD mania can manifest as chronic, nonepisodic, rapid-cycling, and mixed episodes (Coyle, et al., 2003). In diagnosing PBD, the clinician needs to use the adult diagnostic criteria, looking at all of the manifestations of the manic symptoms. Once again, the difficulty for clinicians requires them to fit children and adolescents behaviors into the adult criteria for manic-depressive illness, except for those adolescents who have adult-type onset (i.e., individuals with good functioning until the abrupt onset of marked manic symptomatology) (Geller & Luby, 1997).

Most adolescents and adults show relatively discrete periods of mania or depression with normal functioning periods in between (Kim & Miklowitz, 2002). Prepubertal children present with almost a complete absence of classical manic-depressive illness due, in part, to the co-occurrence of multiple other symptoms and developmental issues (Carlson, 2002). Studies have reported that some prepubertal-onset bipolar disorder children initially display hyperactive symptoms beginning at preschool age that turns into a full manic episode during early grade school (Geller & Luby, 1997). Many children currently diagnosed as having PBD do not fit the classic symptom pattern of bipolar disorder (Youngstrom, Findling, & Feeny, 2004).

According to some reports the typical prepubertal and postpubertal adolescent onsets take the form of mania compared to depression, occurring mostly as mixed episodes and rapid cycling (Kyte, Carlson, & Goodyer, 2006). Those types of onsets can also demonstrate more classic manic symptoms of racing thoughts, compulsive volubility, decreased need for sleep, inappropriate giddiness, or clowning (Miller, 2007). Youngstrom, Findling, and Feeny (2004) outlined what they called *handle* symptoms, such as elevated mood, grandiosity, pressured speech, racing thoughts, and

hypersexuality. Other studies insisted that a child must exhibit symptoms of euphoria and grandiosity to be diagnosed as having PBD (Carlson & Meyer, 2006). Carlson (2002) expanded to say that euphoria and grandiosity are the *only* manic symptoms unique to mania in children and adolescents (Kim & Miklowitz, 2002). While some agreement exists in the inclusion of euphoria and grandiosity as cardinal symptoms of PBD, no accord has occurred on what constitutes euphoria and grandiosity in children (Carlson, 2005; Youngstrom, et al., 2004). This lack of concurrence continues to add to the PBD controversy (Carlson, 2005).

Differentiating symptoms for PBD adds to its controversy. To diagnose children as noted above, clinicians have used adult criteria. For example, pressured speech, racing thoughts, and hypersexuality may be considered specific symptoms of bipolar disorder (Youngstrom, Findling, & Feeny, 2004). However, children with their developmental differences are more complex to differentiate (Youngstrom, et al., 2004). For example, language difficulties need to be differentiated from flight of ideas (Geller & Luby, 1997). Hypersexuality in children can look different than in adults, e.g., with the former demonstrating frequent masturbation, propositioning of teachers, or making sexual comments to classmates (Geller & Luby, 1997). In addition, increased motor activity and goal-directed behaviors can look like normal activities for youth except in an exaggerated amount (Geller & Luby, 1997). Other symptoms with noticeable developmental differences include the impulsive use of money, bizarre appearance, and silliness. The impulsive use of money for children differs, in part, due to their lack of credit cards to charge (Youngstrom, et al., 2004). Bizarre appearance in most children can be limited by their parent's selection of their clothes (Youngstrom, et al., 2004). Lastly, silliness and

laughing are normal childhood behavior, although they too can be associated with euphoria, making it difficult to recognize them as a symptom (Kim & Miklowitz, 2002).

Great debate continues regarding euphoria, grandiosity, and irritability. Euphoria is typically comprised of smiling, being happy or outgoing, initiating interaction, being cheerful and friendly, participating in activities, clowning, and laughing (Carlson, 2005; Kim & Miklowitz, 2002). Some of these behaviors are common in children; however, adults have a tendency to perceive them as euphoric (Carlson & Meyer, 2006). In assessing children, they are often asked about situations or times when they felt "super happy," calling for a level of abstraction that may or may not be developed in children, adolescents, and even some adults (Carlson & Meyer, 2006). This begs the question. How do clinicians ask children about being high or euphoric in an age-appropriate way (Carlson, 2005)?

Carlson (2002) studied the relation between euphoria and age. From this study, the researcher found a significant negative correlation with age and euphoria for children between the ages of 5 and 12 ($r = -0.15$, $p = .026$) (Carlson, 2005). These results illustrated that the younger the child, the more euphoric the child (Carlson, 2005). Some investigators argue that euphoria is unique to pediatric bipolar disorder and should be considered a defining mood disturbance for bipolar children (Wozniak, et al., 2005). Wozniak et al. (2005) reported euphoria occurring as often as 51% in their pediatric bipolar population. However, in other studies, researchers reported seeing euphoria rarely, especially when presenting alone, among children, (Blader & Carlson, 2007; Wozniak, et al., 2005). It is noteworthy that the subjects with euphoria also experienced irritability (89%) (Wozniak, et al., 2005). This suggests that most PBD cases reporting

euphoria can also have irritability as a severe mood disturbance (Wozniak, et al., 2005). Most of those not reporting euphoria, but who had irritability were found to have grandiosity (Wozniak, et al., 2005).

There is substantial support for grandiosity or inflated self-esteem to be considered relatively specific to bipolar disorder (Youngstrom, Findling, & Feeny, 2004). Grandiosity has been reported as having prevalence in PBD patients of 77% (Wozniak, et al., 2005). Geller, Zimerman, Williams, Delbello, Bolhofner, et al. (2002); Geller, Zimerman, Williams, Delbello, Frazier, et al., (2002); and Leibenluft, Charney, Towbin, Bhangoo, and Pine, (2003) recommended that grandiosity be used as a marker of mania in children (Wozniak, et al., 2005). According to the American Psychiatric Association (2000), grandiosity is defined as, "An inflated appraisal of one's worth, power, knowledge, importance, or identity. When extreme, grandiosity may be of delusional proportions" (p. 823). In children, grandiose delusions can present as a child thinking they can fly and demonstrating this belief by hopping from rooftop to rooftop (Geller & Luby, 1997). Other examples of manifestations of grandiose behavior are a child stealing and thinking that he is above the law or believing that she will obtain a prominent profession even though she is failing in school (Geller & Luby, 1997).

Recognition of grandiosity in a child is obscured by the culture and the developmental context of the behavior (Carlson, 2005). The current culture expressed in reality television and the developmental stages of children and adolescents hinder the ability to differentiate between a grandiose symptom and typical behavior (Carlson, 2005). For example, people may audition for reality television shows attempting to prove they are the next rock star even though they cannot carry a tune (Carlson, 2005). How

does one quickly determine whether this is a reflection of grandiosity or of typical stage-related behavior? On the one hand, grandiose delusions are not just false beliefs; rather, they are false beliefs which are not amenable to reason (Carlson, 2005). On the other hand, while some who audition may not at first let go of a false belief, they may eventually yield to reason. How long it takes and how much effort they expend in the pursuit may differ in accordance with their, age, life experience, personal ability, and other developmental factors. In any case, the eventual rejection of the false belief due to reason would bring into question whether or not grandiosity or age-typical behavior was the causal factor. Such a possibility would argue against making a diagnosis, which would include grandiosity, too soon.

Misunderstandings can occur when diagnosing grandiosity. Children can have difficulty distinguishing between pretense and reality, decreasing their ability to self-evaluate grandiose behavior or thoughts (Carlson & Meyer, 2006). A child's accurately answering questions about experiencing grandiosity may require understanding beyond his/her level of maturity (Carlson & Meyer, 2006). Lastly, what looks like grandiosity to adults may really be behaviors primarily driven by environmental factors rather than endogenous factors (Carlson & Meyer, 2006). Several other factors to consider when identifying grandiosity: (a) the decision is not always clear with children, (b) information should be gathered from multiple sources (not just the children), and (c) looking at the context in which the behavior is occurring (Carlson & Meyer, 2006).

While there are a number of researchers who propose using grandiosity and euphoria as the cardinal symptoms for PBD there are others who disagree. Some disagree with the high prevalence rates and say that grandiosity and euphoria are rare in children

(Carlson & Meyer, 2006). Others conclude that grandiosity and euphoria are less common in children than in adults (Wozniak, et al., 2005). Wozniak and colleagues (2005) looked at the presence or absence of euphoria and grandiosity in PBD patients. They found that there was no evidence to support the premise that euphoria and grandiosity are cardinal symptoms of PBD (Wozniak, et al., 2005). Instead, they found that severe irritability might be the symptom for which clinicians may want to look (Wozniak, et al., 2005). In the PBD population that was studied, they found a prevalence of irritability (94%) verses a prevalence of euphoria (51%). These findings support the clinical relevance of severe irritability as the most common presentation in PBD (Wozniak, et al., 2005).

In the Wozniak, Biederman, Kwon, Mick, Faraone, Orlovsky, et al. (2005) study irritability was the most common reason found for PBD hospitalization. This finding was also supported by numerous other studies (Blader 2006b; Gutterman 1998; Nicholson *et al.* 1998; Blader & Carlson, 2007). The leading symptom that brings bipolar children into the mental health care setting is irritability (Gukovich, Carlson, Carlson, Coffey, Wieland, 2007). Parents of more than 36% of inpatients and 25% of outpatients describe their child or adolescent as explosive or irritable (Carlson, 2002). Severe irritability may be the cardinal symptom associated with PBD, which may suggest that irritability may be the more important symptom rather than euphoria and grandiosity (Wozniak, et al., 2005). Scheffer and Niskala Apps (2004) found irritability in 100% of the children under the age of five who had been diagnosed with PBD (Danielyan, Pathak, Kowatch, Arszman, & Johns, 2007). In addition, irritability was reported in 100% of adults and adolescents in their manic phase (Wozniak, et al., 2005). In a community sample of PBD

patient's irritability and dyscontrol was the most pathological finding (Wozniak, et al., 2005). A meta-analysis of studies, from 1930 to 1995, regarding bipolar disorder in all age groups, revealed high rates of irritability in all age groups, co-occurring with mania (Wozniak, et al., 2005). With such high prevalence, it has been posed that irritability be a cardinal symptom of PBD (Carlson & Meyer, 2006).

Evaluating irritability as a symptom tends to be complex due to the frequency and specificity rather than rarity (Carlson, 2002). Irritability has several dimensions: exploding quickly but calming down readily, no explosion but being upset for hours, and rages and/or affective storms (Carlson, 2002; Wozniak, et al., 2005). Explosive behavior has the advantage of being less dependent on an accurate description of an internal state as well as being easier to observe (Carlson & Meyer, 2006). Explosive behaviors may intensify or abate within a week or a month or may be intermittent (Blader & Carlson, 2007). Affective storms are disruptive temper outbursts, which are considered by some to be pathognomonic for PBD patients (Wozniak, et al., 2005). Rages have been reported to occur in to 29% to 62% of children with bipolar disorders (Carlson & Meyer, 2006). Wozniak et al. (2005) found 77% of prepubertal children met the criteria for PBD by demonstrating irritability, 9% demonstrated elevated mood and irritability, 9% were full of high energy, and 5% elevated mood alone (Kim & Miklowitz, 2002).

There are some criticisms of using irritability as a cardinal symptom. Some recognize that irritability is presented in many psychological disorders (Wozniak, et al., 2005). Others think that developmental factors have an impact on irritability, which may confound a PBD diagnosis (Carlson, 2005; Danielyan, Pathak, Kowatch, Arszman, & Johns, 2007). Emotion regulation is a developmentally mediated factor, which can

display a role in the presentation of irritability (Carlson, 2002). Fatigue is also a factor in recognizing the source of irritability. Children who suffer from insomnia from either illness or medications may also present with irritability (Carlson, 2002). Clinicians need to be aware of all of the above as well as the phenomena of families over reporting irritability, especially with adolescents (Youngstrom, Findling, & Feeny, 2004). On the other hand, it has been said that in youths irritability is analogous to fever (Aman, 2002; Youngstrom, et al., 2004) it is an indicator that something is wrong and the degree of irritability may prove to be a gauge of how serious the problem is (Aman, 2002; Youngstrom, et al., 2004). Some researchers agree that the presentation of irritability and severe anger are important. However, they do not agree that it is a cardinal symptom due to its lack of specificity (Staton, Odden, & Volness, 2004; Wozniaket al., 2005). The presentation of irritability is not only common to manic episodes it is also common in depressive episodes (Danielson, Youngstrom, Findling, & Calabrese, 2003). This occurrence clouds the issue of whether irritability is a diagnostic feature of a manic, depressed, or mixed episodes (Youngstrom, et al., 2004).

Adults with childhood onset often report depression as their first symptom (Geller & Luby, 1997). A review of depression has found it to be a commonly occurring mood state of onset and that the rate of developing mania depends on the clinician's definition of mania and the length of follow-up (Carlson & Meyer, 2006). It has been reported that depression was more evident in prepubertal children (Rucklidge, 2008). However, there is a high rate of switching of prepubertal depression to prepubertal mania (32%) and of depressed adolescent switching to adolescent-onset mania (20%) (Geller & Luby, 1997 , Geller et al, 1994, Strober and Carlson, 1982). Switching can make the identification of a

depressive episode more enigmatic. During a depressive episode children may appear more sullen, irritable, unmotivated, sad, show appetite change, and suicidal ideation (Post, Findling, & Kowatch, 2006; Youngstrom, Findling, & Feeny, 2004). For a proper diagnosis, either the children or their parents must be able to understand questions of depressive symptom occurrence (Coyle, Pine, Charney, Lewis, Nemeroff, Carlson, et al., 2003). Therefore, as with other symptoms, developmental maturity must be evaluated.

In the diagnosis process of PBD there is more to assess than symptoms. Cycling and duration of the symptoms must also be addressed. Holding true to the controversies surrounding PBD, cycling and duration are also controversial. Children typically do not show the same cycling patterns as adults. Adults tend to have cycles of distinct mood swings from mania to depression, which last for several months having intervals of normal mood in between (Miller, 2007). Due to the differences between adult and child cycling, it has been posed that episodicity be a cardinal symptom of PBD (Wozniak, Biederman, Kwon, Mick, Faraone, Orlovsky, et al., 2005). Others agreed that adolescents and children are likely to exhibit rapid cycling much more frequently than adults (50-80% of youths vs. 10-20% of adults) (Beiderman et al., 1996; Geller & Libby, 1997; Youngstrom, Findling, & Feeny, 2004). Children with early onset tended to have a more adverse course of PBD including increased number of episodes (Post, Findling, & Kowatch, 2006). Some data suggests that the cycles may be so rapid that they change polarity within the same day, also known as ultradian cycling (Carlson & Meyer, 2006; Youngstrom, et al., 2004; Danielyan, Pathak, Kowatch, Arszman, & Johns, 2007; Staton, Odden, & Volness, 2004). Documented studies report some episodes in children last hours rather than days (Carlson & Meyer, 2006). In another study, it was found that

children and adolescents tend to have a high number of mood cycles and longer duration of the illness (Wozniak, et al., 2005). Suggesting an illness characterized by chronicity and complicated cycling (Wozniak, et al., 2005).

Most PBD patients experience multiple episodes with 20% of them remaining chronically ill and 20% functioning well in between episodes (Carlson & Meyer, 2006). Determining the cycles can be a daunting task. Some children and adolescents with bipolar disorder do not show well defined cycling boundaries, instead showing a chronic presentation with mixed mood symptoms (Youngstrom, Findling, & Feeny, 2004, Geller & Luby, 1997). Wozniak, et al, (1995) reported that only 2% of PBD patients present with non-overlapping episodes of mania and depression versus 84% who showed a chronic history of mixed states (Kim & Miklowitz, 2002). Due to the unusual cycling patterns, it has been recommended to extend the window of assessing PBD (Youngstrom, et al., 2004). With PBD being a disorder that cycles, it is important to understand what type of cycling, or if there is cycling prior to diagnosis. While it would be helpful to clinicians who are unfamiliar with PBD to have knowledge of cardinal symptoms and cycling patterns, much more research is needed to attain that knowledge (Wozniak, Biederman, Kwon, Mick, Faraone, Orlovsky, et al., 2005).

PBD Comorbidity Controversies

Clinical studies have shown that comorbidity in children with PBD is much greater than in adults (Carlson & Meyer, 2006; Kyte, Carlson, & Goodyer, 2006). In child clinical samples, comorbidity tends to be the rule rather than the exception; this is especially true for those diagnosed with early-onset mania (Carlson & Meyer, 2006).

Adolescent-onset PBD patients tend to have less comorbidity than prepubertal patients (Carlson & Meyer, 2006). The symptoms associated with PBD are featured in other pediatric disorders, such as: ADHD, disruptive behavior disorders (e.g., oppositional defiant disorder and conduct disorder), depression, and autism spectrum disorders (Carlson, 2002; Gukovich, Carlson, Carlson, Coffey, & Wieland, 2007). Some of the most common disorders found co-occurring with mania are ADHD, oppositional defiant disorder, and depression (Carlson, 2002; Danielyan, Pathak, Kowatch, Arszman, & Johns, 2007).

One side of the comorbidity controversy is that the symptom overlap with other disorders is the cause of high comorbidity rates in PBD (Carlson & Meyer, 2006). However, an opposing view is that high comorbidity rates may be due to the narrowing of diagnostic criteria (Carlson & Meyer, 2006). Yet, another contention poses that re-identifying children with PBD who had previously been diagnosed as having oppositional defiant disorder and conduct disorder artificially increases comorbidity (Carlson, 2005). With the increased rates of comorbidity, some clinicians are reassessing their previous diagnoses. Due to the high rates of comorbidity there has been some who think that there should be categories for comorbidity. Four categories recommended are: heterotypic (close relationships between different disorders), homotypic (different aspects of the same condition), concurrent (conditions that are occurring at the same time), and successive (one disorder follows the onset of another) (Carlson & Meyer, 2006). Others think that it is not a comorbidity problem. Instead, it may be a diagnostic problem.

The rate of comorbidity of ADHD and PBD is 50-98%, which has caused debate about the validity of the comorbid designation (Danielyan, Pathak, Kowatch, Arszman, &

Johns, 2007; Kim & Miklowitz, 2002; Post, Findling, & Kowatch, 2006; Youngstrom, Findling, & Feeny, 2004). It has been found that 30% of children diagnosed as having ADHD are later diagnosed with PBD and up to 50-57% of children and adolescents with PBD also fit the diagnostic criteria for ADHD (Kim & Miklowitz, 2002; Miller, 2007). An important point to note: the symptoms being diagnosed appear the same, but recognizing developmental factors related to those symptoms may produce new forms of expression (Youngstrom, et al., 2004). It has been posed that PBD and ADHD are the same entities with ADHD being the signal to early-onset bipolar disorder (Kim & Miklowitz, 2002). Another theory is that ADHD may be a developmental marker of PBD (Kim & Miklowitz, 2002). With the premorbid elevated rates of attention problems among PBD patients, it is debated that it is an antecedent to childhood psychopathology (Youngstrom, et al., 2004).

Diagnosing PBD and ADHD is challenging because of the significant overlap in symptoms (Danielson, Youngstrom, Findling, & Calabrese, 2003; Gukovich, Carlson, Carlson, Coffey, Wieland, 2007). Differentiating mania from hyperactivity and impulsivity is difficult since there is great similarity in their presentations (Danielson, et al., 2003). Associated symptoms of ADHD that may affect differentiating diagnoses are: sleep difficulty, low frustration tolerance, emotional lability, rapid speech, flight of ideas, hyperactivity, irritability, and distractibility (Carlson, 2002; Kim & Miklowitz, 2002; Rucklidge, 2008; Youngstrom, et al., 2004). Most of these symptoms appear in PBD patients in one form or another (Carlson, 2002; Kim & Miklowitz, 2002; Rucklidge, 2008; Youngstrom, et al., 2004). High levels of aggression, irritability, and mania non-specific mood dysregulations are reported to be a result of the presence of comorbid

ADHD (Danielyan, Pathak, Kowatch, Arszman, & Johns, 2007). Conversely, some conclude that the expression of irritability in children with ADHD is heterogeneous and it is possible to differentiate the type of irritability in mania versus ADHD (Wozniak, et al., 2005), although they add that the irritability associated with mania was quite rare.

Differentiating between ADHD and mania in children is complicated by the lack of episodic history, which could distinguish it from comorbidity versus early symptoms of mania or depression (Carlson & Meyer, 2006). Typical ADHD symptoms of hyperactivity, inattention, and impulsivity have been found to be virtually identical in their symptom occurrence, trajectory, and severity as with PBD symptom presentations (Post, Findling, & Kowatch, 2006). Few symptoms show significant differences between adolescents assessed as having ADHD only and those having both ADHD and PBD (Rucklidge, 2008). Carlson, Loney, Salisbury, & Volpe, (1998) found that only symptoms of depression and anxiety differentiate between children with PBD and those with ADHD (Carlson & Meyer, 2006). Mania being a marker to PBD versus ADHD does not clarify diagnoses since removal of once comorbid symptoms are gone, mania will disappear (Carlson, 2005). Faraone and colleagues (1997) suggest that ADHD differs from ADHD with PBD and that there be a subtype of PBD for those with ADHD (Kim & Miklowitz, 2002). Carlson (2002) suggested that the manic syndrome of ADHD, (e.g., emotional lability), may be a psychopathology of another disorder (Kim & Miklowitz, 2002).

Mania and attention problems can be confused with each other and may be better accounted for by disorders other than ADHD (Carlson & Meyer, 2006). Disruptive behavior disorders are a good example. Hypomania is difficult to differentiate from

hyperactivity, as is PBD and disruptive behavior disorders (Danielson, Youngstrom, Findling, & Calabrese, 2003). Chronic behavioral volatility and poor frustration tolerance are not seen only in PBD patients, they are also seen in children with ADHD and oppositional defiant disorder (Blader & Carlson, 2007). PBD and oppositional defiant disorder are also similar in their presentations and have a tendency to be comorbid (Youngstrom, Findling, & Feeny, 2004). Both involve defiance and resistance to redirection of their behavior and involve incidence of aggression (Youngstrom, et al., 2004).

There is frequent comorbidity of PBD and conduct disorder (Kim & Miklowitz, 2002). Kovacs and Pollock (1995) reported a lifetime comorbidity among PBD patients of 69% and 54% episode comorbidity with conduct disorder (CD) (Kim & Miklowitz, 2002). Conduct disorder occurs in approximately 22% of bipolar children and 18% of bipolar adolescents (Geller & Luby, 1997). Conduct disorder is difficult to differentiate from PBD due to both having associations with increased sexual disinhibitions and promiscuity, increased substance abuse, disregard for rules, poor impulse control and aggression (Kovacs & Pollock, 1995; Youngstrom, Findling, & Feeny, 2004). Other overlapping features of mania and CD include impulsivity and irritability (Kim & Miklowitz, 2002). Mixed or rapid cycling of PBD episodes also complicates differentiating PBD from ADHD, CD, and even normal childhood development (Kim & Miklowitz, 2002). It has been argued that PBD can be differentiated from CD due to it having a lengthy prodromal period with progression from less to more severe rule-breaking behavior (Kim & Miklowitz, 2002). However, studies need to address whether

clinicians are identifying severe cases of disruptive behavior disorders or PBD, prior to attempting to differentiate its symptoms (Kim & Miklowitz, 2002).

Diagnosing PBD is further complicated by the presence of comorbid conditions (e.g., ADHD, CD, and ODD) especially for those children with depression (Coyle, et al., 2003). Symptoms of mood disorders are common in children with ADHD, CD, ODD, and PBD (Coyle, et al., 2003). Major depression is a serious psychiatric disorder with a prevalence of up to 2% (Coyle, et al., 2003). This disorder like PBD is diagnosed using the same criteria as used with adults (Coyle, et al., 2003). Differentiation of bipolar from depression symptoms is recognized as difficult in both adults and youth (Danielson, Youngstrom, Findling, & Calabrese, 2003). Bipolar disorder in adults is often inappropriately treated due to it being mistaken for major depression (Danielson, et al., 2003). In a study by Milberger, Biederman, Faraone, Murphy, and Tsang (1995), they found that the diagnoses of PBD was maintained less frequently than the diagnoses of major depression when overlapping symptoms were removed (Kim & Miklowitz, 2002). Initial diagnosing of children and adolescents with major depression versus a bipolar disorder is in dispute since a youth could be experiencing a major depressive episode in and of itself, or the youth could be experiencing a depressive episode of bipolar disorder (Danielson, et al., 2003). Making the distinctions between the two disorders is still being debated (Danielson, et al., 2003).

Lastly, the comorbidity of PBD and autism spectrum disorder (ASD) has also been controversial (Gukovich, Carlson, Carlson, Coffey, & Wieland, 2007). There have been reports of high rates of bipolar disorder in families with Asperger's disorder (Gukovich, et al., 2007). Although studies on autism and bipolar disorders show no

connection between them (Gukovich, et al., 2007), higher-functioning ASD patients can exhibit symptoms of mania such as: irritability, elevated or labile mood, distractibility, psychomotor agitation, and grandiosity (Gukovich, et al., 2007). Then again, it may be difficult to differentiate overwhelmed behaviors of ASD children from what appear to be PBD "mood swings" (Gukovich, et al., 2007). Attempting to get a subjective description of euphoria, grandiosity, depression, or anhedonia from children with Asperger's disorder tends to also be a challenge (Gukovich, et al., 2007). Children diagnosed with Asperger's have difficulty with recognizing and expressing feelings (Gukovich, et al., 2007). With the developmental complexities of ASD, it is difficult to disentangle symptoms of the primary disorder from the comorbid disorder (Gukovich, et al., 2007). Due to this perplexing presentation of symptoms, bipolar disorder in developmentally disabled children, including some children with Asperger's disorder, remains largely unrecognized or diagnosed (Gukovich, et al., 2007).

With the controversy surrounding the diagnosis and comorbidity of PBD, it is important to understand the ramifications of potential misdiagnoses. Mania in children continues to be frequently misdiagnosed or underdiagnosed (Danielyan, et al., 2007). Youngstrom, Findling, and Feeny (2004) still claimed "…the differential diagnosis of bipolar disorder [in children and adolescents] is a high-stakes decision" (p.58). Underdiagnosis of PBD means under-treatment for some and provision of appropriate treatment and services to potentially only the most severe patients (Kim & Miklowitz, 2002). Not treating PBD can increase the risk of the disorder becoming more severe and resistant to treatment (Youngstrom, et al., 2004). Overdiagnosis remains a problem given the uncertainties about short-and long-term effects of psychotropic medications (Kim &

Miklowitz, 2002). In addition, the potential effects of stigmatization of being labeled PBD needs to be recognized (Kim & Miklowitz, 2002). The inappropriate medication of children, whether diagnosed or not diagnosed, with PBD may have a serious impact on a child or adolescent (Youngstrom, et al., 2004). Part of the PBD controversy is about the ability of medication to activate or agitate misdiagnosed children (Carlson, 2005). Some stimulant and antidepressant medications are thought to actually be harmful if prescribed to a PBD patient (Youngstrom, et al., 2004). However, some studies conclude that there is no evidence that stimulants or antidepressants can activate or agitate someone with PBD (Carlson, 2005). With all of the controversy surrounding PBD the only thing that is certain is more research is needed to provide some consensus on the prevalence, the symptomatology, and the comorbidity of PBD.

Goals & Hypotheses

The goal of this research is to document some of the controversies surrounding PBD and to strive for clarity of the symptomatology and comorbidity of this disorder. The focus will be to investigate and to describe the findings regarding the following hypotheses: (1) symptomatology will differ between PBD and the *DSM-IV-TR* diagnostic criteria for adult bipolar disorder; (2) a positive relationship exists between the occurrence of PBD and attention-deficit/hyperactivity disorders (ADHD) diagnoses; (3) a positive relationship exists between the occurrence of PBD and disruptive behavior disorder diagnoses; (4) a positive relationship exists between the occurrence of PBD and depression diagnoses; and (5) a positive relationship exists between the occurrence of PBD and autism spectrum disorder diagnoses.

Method

To test these hypotheses, I used a quantitative non-experimental survey meta-analysis. A meta-analysis is a research model that arrives at a reasonable summary of quantitative findings from empirical research (Lipsey & Wilson, 2001). This meta-analysis brought the data together from multiple studies to clarify the overall research on the topic of PBD. A meta-analysis is a quantitative survey research analysis of various studies focusing on the aggregation and comparison of the effect size of each candidate study (Lipsey & Wilson, 2001). In order to execute a meta-analysis, computing the effect size and the inverse variance weight must first be performed on each candidate (Lipsey & Wilson, 2001). The effect size is the statistic used to encode the critical quantitative information from each study (Lipsey & Wilson, 2001). From this, a statistical standardization is produced which can be interpreted across studies (Lipsey & Wilson, 2001). The inverse variance weight is the inverse of the squared error value computed to give comparable weight to each sampling distribution while still giving more weight to studies with greater reliability, (i.e., larger sample studies) (Lipsey & Wilson, 2001). When the data are analyzed, the mean magnitude of an indexed relationship is studied. According to Lipsey and Wilson (2001), "Meta-analysis yields one or more mean effect sizes representing the average magnitude of the indexed relationship for specific categories of studies, constructs, samples, and the like, depending on the topic and focus selected by the analyst" (p. 146). The mean magnitude is the average strength of the relationship being analyzed (Lipsey & Wilson, 2001).

This study was designed to elucidate a consensus on the symptomatology and comorbidity of pediatric bipolar disorder. Within this chapter, I will describe the

candidates, who they were, the selection process, and the overall number of candidates. Next, I will describe the materials used for this study including the tools used to find the candidates, organization of the search and retrieval protocol, the surveys, and the data-analysis program. The remainder of this chapter will outline the procedures and protocols of this study.

Candidates

This investigation was a meta-analysis of pediatric bipolar disorder. Such studies utilize systematically selected peer-reviewed empirical studies as research subjects or, as termed in a meta-analysis, candidates for study. Inclusion criteria for the candidates included that the candidates were from quantitative studies of pediatric bipolar disorder researching symptomatology and/or comorbidity. In addition, in order to meta-analyze the candidates' data the candidates research had to have been analyzed using the following statistics: standardized mean difference, correlation coefficient, and odds-ratio (Lipsey & Wilson, 2001). There was no age limit for the candidates or publication status limitations. However, the candidates' research had to either be written in English or translated to English. Exclusion criteria included potential candidates that did not contain empirical data, were vague in reporting their empirical data, and those studies that did not use statistics appropriate for inclusion in a structured meta-analysis.

All of the candidates were selected from publicly accessible databases and the articles contained preexisting research, with which data were collected, prepared, and analyzed for outcomes. In order to locate candidates for this study there was a potential candidate pool developed. The potential candidate pool was created by a comprehensive search of databases. The search was guided by a stringent search protocol, which

included a database search matrix (see Appendix A), that included 26 potential databases to search; and each search used predesigned multiple word searches (see Table 1). There was no preset limit on the number of candidates. However, the search productivity limitation protocol limited the search to seven databases due to lack of search productivity. The number of candidates was decided by the candidates' ability to meet inclusion criteria. The selection of the candidates came from a potential candidate pool. Potential candidates in the pool were surveyed to determine their inclusion or exclusion suitability. If they met the first survey's inclusion criteria, they were surveyed by the second survey, which focused on the statistical inclusion suitability of the potential candidate. Both surveys were created specifically for this study in order to recognize inclusion and exclusion criteria for the candidates and assist in organization of the study.

There was no limit on how many candidates would be included in any of the meta-analyses. However, there was a productivity limitation on the continuation of database searches for the candidate pool, from which I chose the candidates. The candidates were chosen from a candidate pool of 861 potential candidates. There were 54 candidates used in this research (see Table 2), which included a total of 10,318 participants. All candidates that met inclusion criteria were used in this study.

Table 1

Databases searched, Number of searches, Query results

Database Name	Number of Searches	Articles Meeting Initial Criteria	Articles Meeting Query I Criteria	Articles Meeting Query II Criteria	Total Candidates
Psych Info	80	162	98	28	28
Proquest	72	336	56	12	12
Psych Lit	72	161	33	3	3
CINAHL	72	87	44	6	6
MEDLINE	72	59	28	5	5
Psych & Behavioral Sciences	72	27	13	0	0
EJC	72	29	20	0	0
Totals	512	861	292	54	54

Table 2

Meta-analysis Candidates

Candidate's First Author	Year	**Candidate's** First Author	Year	**Candidate's** First Author	Year
Akiskal, H.	1985	Goldstein, B. I.	2006	Post, R. M.	2006
Axelson, D.	2006	Goldstein, T. R.	2007	Rende, R.	2007
Biederman, J.	2005	Harpold, T. L.	2005	Rende, R.	2006
Biederman, J.	2004	Kahana, S. Y.	2003	Rucklidge, J. J.	2008
Biederman, J.	2004	Lázaro, L.	2007	Scheffer, R. E.	2004
Biederman, J.	2004	Lee, J. H.	2008	Schenkel, L. S.	2008
Biederman, J.	2007	Leverich, G.	2007	Staton, D.	2008
Birmaher, B.	2006	Lewinsohn, P.	1995	Tillman, R.	2007
Dickstein, D. P.	2005	Leyfer, O. T.	2006	Tillman, R.	2003
Faedda, G. L.,	2004	Luby, J.	2006	Tillman, R.	2004
Faedda, G. L.	2004	Marchand, W. R.	2006	Tillman, R.	2008
Findling, R. L.	2001	Masi, G.	2007	Towbin, K. E.	2005
Geller, B.	2008	Masi, G.	2006	Tumuluru, R. V.	2003
Geller, B.	2002	Mick, E.	2003	West, A. E.	2008
Geller, B.	2004	Moreno, C.	2007	West, S.	1995
Geller, B.	2000	Patel, N. C.	2006	Wozniak, J.	2005
Geller, B.	2000	Pavuluri, M. N.	2004	Wozniak, J.	2004
Glahn, D. C.	2005	Pavuluri, M. N.	2006	Youngstrom, E.	2005

*Candidate studies are noted in the reference section with an * at the beginning of each reference citation.*

Materials

Potential candidates were located via online electronic journal search engines. Candidate searches were organized in the Microsoft® ACCESS program. In ACCESS, a database search matrix was the tool used to organize the databases to search (see Appendix A). The database search matrix included searches of review articles, references in studies, computerized bibliographic databases, bibliographic reference volumes, relevant journals, conference programs and proceedings, authors or experts in pediatric bipolar disorder, and government agencies. A matrix of search words (see Appendix B) in ACCESS was the tool used to organize and stay consistent in the search process. The internet was searched and retrieval of candidate studies occurred via: direct retrieval from search engines, interlibrary loan, journal publication websites, and association websites. ACCESS was again used to organize the potential candidates by containing them in a candidate pool matrix (see Appendix C). Once retrieved, Refworks ® reference database was used to organize the references and abstracts of the potential candidate studies.

Two surveys were administered to potential candidates. The first survey (see Appendix D) included the American Psychological Association's standards to rate the degree of experimental control (Kim, 2008). The American Psychological Association's criteria includes: (a) randomization of sample; (b) definition of specific problem and/or population; (c) use of reliable and validated measures; and (d) sample size (Kim, 2008). In addition, it included key identifying information of the candidate, statistical framework used, number of references to include in the potential candidate pool and their location, and the status of the candidate (i.e., denied, lit review, undetermined, accepted). The second survey (see Appendix E) noted the following criteria of each candidate:

distinguishing features, research respondents, key variables, research designs, cultural and linguistic range, time frame, publication type, and its coding status. Once the data were collected, I used C.M.A., a computer meta-analysis program by Biostat ®, to analyze the data. The CMA meta-analysis program was developed from a grant of the National Institute of Health in the US and the SBIR program which is a part of the U.S. Department of Health and Human Services (Borenstein, Hedges, Higgins, & Rothstein, 2005).

Procedure

I conducted a comprehensive literature review identifying potential candidate studies on PBD. I utilized a systematic search protocol that included a database search matrix (see Appendix A) and a word search matrix (see Appendix B). In addition, I used a retrieval protocol using a candidate pool matrix (see Appendix C). The database matrix contained 26 databases ranked according to expected successful access to the appropriate results. There were no limits on how many candidates would be included. However, there was a limit on how many searches performed, which was determined by the retrieval success rate of each database. When the search retrieval success was down by 80% or more for two consecutive databases, the search process would discontinue. The word search matrix contained between 72 and 80 search word combinations (see Table 1) that were used in searching each database. The numbers of searched words varied due to differences in search engine amenities.

To assist in reliability of the study a strict systematic search protocol was used for each database searched. Each database was searched using the same words, unless the search engine did not use those words. For each database the search word results list

would be printed. Each result's abstract was read and a determination was made if the potential candidate met the basic inclusion or exclusion criteria (i.e., quantitative research, PBD symptomatology or comorbidity). If it met inclusion criteria the result, or potential candidate, would be entered into the candidate pool matrix after being checked for duplication in the matrix and then given an identification number. The potential candidates were downloaded from the database searched or ordered via interlibrary loan for later download, printing, and query. This search process was repeated until the retrieval success rate dropped to 20% or less for two consecutive databases.

All potential candidates were printed and placed in a color-coded sorting system. The color-coded system represented the status of the candidate. Such as, if the potential candidate was ready for the first query with survey 1, ready for the second query with survey 2, accepted as a candidate, accepted as a lit review contributor, accepted as a candidate and lit review contributor, or denied participation as a candidate. The color system was also used in the candidate pool matrix as a quick way to recognize where each candidate was in the data collection and analysis process. Once printed, each potential candidate in the pool was first queried by survey 1 and a designation among the following was chosen.: denied, lit review, undecided, or accepted. The potential candidates were placed in the appropriate color-coded container, and their status was noted in the candidate pool matrix. Potential candidates that were denied were excluded from the study. Potential candidates that were undecided were reread and then given one of the other designations. Potential candidates that were designated as lit review were set aside for future integration into literature review section. The potential candidates that

were accepted were then moved into the color-coded container for the second query by survey 2.

Those potential candidates accepted by survey 1 (see Table 1) were then queried by survey 2, which primarily focused on key identifying information of the candidate, topic of research in the study, the statistical framework used, and the status of the candidate (i.e., denied, candidate moved to coding database, candidate coded). If the candidate was denied, they were eliminated from the study. For those candidates that met all inclusion criteria (see Table 1) their reference citation and abstract were placed into a Refworks® program where they could be accessed for citation and referencing later in the writing process.

The accepted candidates were sorted according to the category of their research findings (i.e., symptomatology, comorbidity, etc.) and their statistics used. Once sorted, it was found that in order to interpret the data, 15 meta-analyses would need to be performed. The data were coded into one or more of 15 meta-analyses in the CMA computer program by their identification number and the last name of first author. The candidates' data determined that one variable relationships (central tendency descriptions) would be looked at in each of the meta-analyses. Each candidate's effect size, standard error, and inverse variance weight was calculated using the formula that was appropriate for the candidates research data (see Table 3). To provide increased reliability a die was rolled to determine how many codes would be checked for recording errors and calculation errors. It was found that every forth candidate's data would be checked for recording errors and the effect size, standard error, and inverse variance weight was recalculated by hand. All of the data were found to be reliable.

Table 3:

Effect Size, Standard Error, and Inverse Variance Weight Formulas

Effect Size Type	Effect Size Statistic	Standard Error	Inverse Variance
	One Variable Relationships–Central Tendency Description		
Proportion–direct method	$ES_p = p = \frac{k}{n}$	$SE_p = \sqrt{\frac{p(1-p)}{n}}$	$w_p = \frac{n}{p(1-p)}$
Proportion–logit method	$ES_l = \log_e\left[\frac{p}{1-p}\right]$	$SE_l = \sqrt{\frac{1}{np} + \frac{1}{n(1-p)}}$	$w_l = np(1-p)$
Arithmetic mean	$ES_m = \bar{X} = \frac{\Sigma x_i}{n}$	$SE_m = \frac{s}{\sqrt{n}}$	$w_m = \frac{n}{s^2}$

Once the data were checked, the meta-analysis calculations were performed via the computerized program. The program's calculations resulted in the following scores for each meta-analysis: mean effect size, 95% confidence intervals, and an I^2 Index. In order to have a clearer test for heterogeneity I chose to report the I^2 Index, also known as a Monte Carlo simulation (Huedo-Medina, Sanchez-Meca, Martin-Martinez, & Botella, 2006), instead of the Q test score. With regards to a meta-analysis the Q test score only informs the meta-analyist if there is a presence of heterogeneity instead of informing if there is an absence, nor does it provide information on the degree of heterogeneity (Huedo-Medina, Sanchez-Meca, Martin-Martinez, & Botella, 2006). Another limitation of the Q test is it has too much power with large sample size studies and too little power with small sample size studies (Higgins, Thompson, Deeks, Altman, 2003). On the other hand the I^2 Index measures the proportion of inconsistency in individual studies that cannot be explained by chance (Higgins, Thompson, Deeks, Altman, 2003). If the

heterogeneity is high it determines if a fixed or a random effect size is used. When the heterogenity is high the meta-analyst will need to choose a random effect size model in order to take into account both with-in and between-studies variability (Huedo-Medina, Sanchez-Meca, Martin-Martinez, & Botella, 2006). A random-effects model takes into account subject-level sampling error and study-level sampling error (Lipsey & Wilson, 2001).

Results

Of the original 861 potential candidates, 54 met full inclusion criteria and became candidates for this study. In order to address all five research hypotheses, 15 meta-analyses were performed. Not all of the 54 candidates were used in each of the meta-analyses. Each candidate was used in one or more meta-analyses. The type of research conducted within the candidate study determined candidate inclusion in each meta-analysis. In order to provide greater clarity regarding this research this section will be presented according to the hypothesis being tested.

Hypothesis One

The first hypothesis of this study stated that the symptomatology of PBD would differ from the *DSM-IV-TR* diagnostic criteria for adult bipolar disorder. In surveying the potential candidate pool, it was found that there were insufficient candidate samples to explore the complete diagnostic criteria for PBD. However, there were candidates that researched partial PBD symptom criteria (see Tables 4 & 5) and PBD diagnostic type prevalence (see Table 6). Tables 4, 5, and 6 present the number of candidates (*N*) per meta-analysis for symptom and diagnostic type, participant total of the candidates (*k*), I^2

test of heterogeneity, weighted mean random effect size ($\overline{ES}\mu$ or $\overline{ES}\rho$), and confidence intervals (CI).

The candidates that included symptom criteria research looked at age of onset and the cardinal symptoms of mania. A meta-analysis was performed to obtain a mean age of onset of PBD age of onset (see Table 50). In addition, meta-analyses were computed to obtain proportion rates of symptom occurrence of euphoria, grandiosity, and irritability in mania. The mean age of onset of PBD was determined by performing a meta-analysis looking at the one-variable relationship of the means and standard deviations of 50 (N=50) of the original 54 candidates who met inclusion criteria. Within those 50 research study candidates there were 4,946 (k=4,946) research participants. From the 50 candidates weighted mean effect sizes were computed providing a statistically significant average age of onset of PBD of 8.33 years of age (I^2 = 99.7%; $\overline{ES}$μ = 8.33; 95%CI: 7.06 to 9.61; p = 0.00).

Table 4

Hypothesis 1: Age of Onset

Symptom Type	Candidate (*N*)	Participants (*k*)	Random Effect Size Mean ($\overline{ES}\mu$)	*p* Value	Confidence Intervals (95% CI)	Heterogeneity Index & Rating (I^2)
Age of Onset	50	4,946	8.33 years old	0.000	7.06 - 9.61	99.7% (High)

The one-variable relationship proportion rates of mania symptoms of euphoria, grandiosity, and irritability were computed from three meta-analyses with 24 candidates (*N*=24), 22 candidates (*N* = 22), and 24 candidates (*N* =24) respectively (see Table 5). The 24 candidates studying euphoria symptom rates had 2,562 participants (*k* = 2,562). The meta-analysis results produced a statistically significant mean percentage rate of the euphoria symptoms in mania of 58.3% (I^2 = 96.4%; $\overline{ES}\rho$ = 67.2%; 95%CI: 54.6% to 77.8%; *p* = 0.008). The meta-analysis computing grandiosity symptom rates had 22 candidates which included 2,096 participants (*k* = 2,096), from which a statistically significant mean percentage of 70.1% grandiosity symptoms in mania was found (I^2 = 91.03%; $\overline{ES}\rho$ = 70.1%; 95%CI: 62.2% to 76/9%; *p* = 0.00). Lastly, the statistically significant irritability symptom rates in mania was 85.5% as produced by a meta-analysis with 24 candidates with 2,438 participants (*k* = 2,438; I^2 = 91.03%; $\overline{ES}\rho$ = 85.5%; 95%CI: 79.0% to 90.2%; *p* = 0.00).

Table 5

Hypothesis 1: Mania Symptoms

Mania Symptoms	Candidates (*M*)	Participants (*k*)	Random Mean Effect Size Proportion ($\overline{ES}_\rho$)	*p* Values	Confidence Intervals (95% CI)	Heterogeneity Index & Rating (I^2)
Euphoria	24	2,562	67.2%	0.008	54.6% - 77.8%	96.4% (High)
Grandiosity	22	2,096	70.1%	0.000	62.2% - 76.9%	91.03% (High)
Irritability	24	2,438	85.5%	0.000	79.0% - 90.2%	90.9% (High)

Candidates that provided data on diagnostic types of PBD (see Table 6) looked at the prevalence of PBD-I, PBD-II, and PBD-NOS. In addition, they looked at the cycling type prevalence of chronic, rapid, and episodic. One-variable relationship meta-analyses were conducted to obtain prevalence rates of types of PBD diagnoses, including PBD-I, PBD-II, PBD-NOS, and types of episodic, chronic, and rapid cycling. There were 19 (*N* = 19) studies, with 2,906 participants (*k* = 2,906), measuring PBD-I rates that met candidate inclusion criteria. This meta-analysis produced a statistically significant random mean

effect size prevalence rate 58.2% of all PBD diagnoses being PBD-I diagnoses (I^2 = 93.2%; $\overline{ES}_\rho$ = 58.2%; 95%CI: 50.3% to 65.8%; p = 0.04). The meta-analysis looking at the mean prevalence rates of PBD-II diagnoses had 18 (N = 18) candidates that met inclusion criteria with 2,885 participants (k = 2,885). It produced a statistically significant mean effect size prevalence rate of 15.0% (I^2 = 93.2%; $\overline{ES}_\rho$ = 15.0%; 95%CI: 10.1% to 21.8%; p = 0.00). The mean prevalence rates of PBD-NOS were produced from 14 (N = 14) candidates with 2,107 participants (k = 2,107). This analysis resulted in a statistically significant mean effect size prevalence rate of 31.3% (I^2 = 80.7%; $\overline{ES}_\rho$ = 31.3%; 95%CI: 26.2% to 36.9%; p = 0.00).

Diagnostic cycling type prevalence rates were also meta-analyzed (see Table 6). Fifteen candidates (N = 15) met inclusion criteria for the meta-analysis of prevalence rates of chronic type of mania. These 15 candidates included 1,700 participants (k = 1,700). The meta-analysis on chronic type of cycling did not result in statistically significant findings. However, there was a statistically significant finding for the prevalence rate for rapid cycling. The mean effect size prevalence rate of 29.5% was produced from a meta-analysis of 11 candidates reporting the mean prevalence rates of rapid cycling (I^2 = 90.4%; k = 1,404; $\overline{ES}_\rho$ = 29.5%; 95%CI: 22% to 38.3%; p = 0.00). Lastly, a meta-analysis of 16 candidates (N = 15; k = 1,793) studying the prevalence rates of episodic cycling. A statistically significant mean effect size prevalence rate of 28.5% was produced (I^2 = 93.8%; $\overline{ES}_\rho$ = 32.0%; 95%CI: 20.2% to 38.7%; p = 0.00).

Table 6

Hypothesis 1: Diagnostic Type & Cycling Type

Diagnostic Type	Candidates (*N*)	Participants (*k*)	Random Effect Size Mean ($\overline{ES}\mu$)	*p* Values	Confidence Intervals (95% CI)	Heterogeneity Index & Rating (I^2)
PBD-I	19	2,906	58.2%	0.042	50.3% - 65.8%	93.2% (High)
PBD-II	18	2,885	15.0%	0.000	10.1% - 21.8%	93.2% (High)
PBD-NOS	14	2,107	31.3%	0.000	26.2% - 36.9%	80.7% (High)
Cycling Type	**Candidates (*N*)**	**Participants (*k*)**	**Random Mean Effect Size Proportion ($\overline{ES}\rho$)**	***p* Values**	**Confidence Intervals (95% CI)**	**Heterogeneity Index & Rating (I^2)**
Chronic	15	1,700	61.%	0.171 Not Signif	45.1% - 75.1%	96.8% (High)
Rapid	11	1,404	29.5%	0.000	22.0% - 38.3%	90.4% (High)
Episodic	16	1,793	28.5%	0.000	20.2% - 38.7%	93.8% (High)

Hypothesis one, looking at the overall symptomatology of PBD, was not addressed due to the lack of empirical research data to produce a meta-analytic result. However, there were data looking at specific symptoms of PBD, prevalence rates of diagnostic types, and prevalence rates of cycling types. There were ten meta-analyses performed resulting in statistically significant findings for nine of them. The meta-analyses looking at specific symptoms of PBD resulted a mean age of onset of 8.33 years and prevalence rates for mania symptoms of euphoria (67.2%), grandiosity (70.1%), and irritability (85.5%). The meta-analyses looking at prevalence rates of diagnostic types resulted in PBD-I rates of 58.2%, PBD-II of 15%, and PBD-NOS rates of 31.3%. Lastly, the meta-analyses for cycling type found prevalence rates for rapid cycling of 29.5% and a rate of 28.5% for episodic. However, the meta-analysis for chronic cycling did not produce a significant find.

Hypothesis Two

The second hypothesis of this study predicts that there will be a positive relationship between the diagnostic occurrence of attention-deficit/hyperactivity disorders (ADHD) and PBD. Of the 54 candidates, 50 ($N = 50$) met inclusion criteria for the meta-analysis looking at the relationship between ADHD in children and PBD. The primary inclusion criteria was determined by the potential candidates focus on calculating the comorbidity rates of ADHD in children and PBD. A one-variable relationship meta-analysis was conducted to obtain prevalence rates of the comorbidity of ADHD and PBD in children (see Table 7). Within the 50 candidates entered in to this meta-analysis there were 4,193 participants ($k = 4{,}193$). The results from the meta-analysis found a

statistically significant random mean effect size prevalence rate of 64.8% (I^2 = 92.9%; $\overline{ES}\rho$ = 64.8%; 95%CI: 58.0% to 71.1%; p = 0.00).

In response to hypothesis two of this study a meta-analysis using research data on the prevalence rates of ADHD and PBD comorbidity was performed. The meta-analysis of 50 candidates yielded a statistically significant finding. This resulted in a comorbidity prevalence rate of 64.8%.

Hypothesis Three

This study's third hypothesis suggested that there would be a positive relationship between a diagnosis of a disruptive behavior disorder in children and PBD. Within the disruptive behavior disorder category there were two diagnoses found in the literature: oppositional defiant disorder (ODD) and conduct disorder (CD). To explore both disruptive behavior disorder comorbidity questions, two meta-analyses were conducted. The first meta-analysis utilized a one-variable relationship meta-analysis to obtain prevalence rates of the comorbidity of ODD and PBD (see Table 7). Of the 54 candidates 36 (N = 36) met inclusion criteria for studies researching a comorbid diagnosis of oppositional defiant disorder in children and PBD. Within those 36 studies there were 3,169 participants (k = 3, 169). The random mean effect size prevalence rate of comorbid diagnoses of ODD and PBD were 48.5% ($\overline{ES}\rho$ = 48.5%). This was not statistically significant (I^2 = 94.0%; 95%CI: 39.6% to 57.6%; p = 0.750). The second meta-analysis calculated the comorbidity prevalence rates of conduct disorder (CD) and PBD (see Table 50). There were 43 candidates (N = 43) of the 54 that met inclusion criteria. Within the 43 candidate studies there were 3,625 participants (k = 3, 625) included. The findings of that meta-analysis resulted in a statistically significant mean effect size prevalence rate of

29% (I^2 = 95.0%; $\overline{ES}_\rho$ = 29%; 95%CI: 21.4% to 38%; p = 0.00) for comorbid diagnoses of CD and PBD.

In researching the prevalence rates of behavior disorders and PBD two meta-analyses were performed. Only the meta-analysis of 43 candidates looking at the comorbidity of conduct disorder and PBD produced a statistically significant finding, which was a prevalence rate of 29%. The meta-analysis of 36 candidates with data on the comorbidity prevalence rate of oppositional defiant disorder and PBD did not result in a statistically significant finding.

Hypothesis Four

The fourth hypothesis of this study stated that there would be a positive relationship between major depression (MD) and PBD. A one-variable relationship meta-analysis was performed using the 17 candidates (N = 17) that met inclusion criteria. One-thousand five-hundred and thirty-one participants (k = 1, 531) were included in those 17 candidate studies. Results from this meta-analysis (see Table 7) did not yield statistically significant findings on the prevalence rates of MD and PBD comorbidity (I^2 = 90.1%; $\overline{ES}_\rho$ = 52.8%; 95%CI: 42.2% to 63.1%; $p = 0.611$).

In summary, a meta-analysis of 17 candidates with quantitative results on the comorbidity prevalence rates of major depression and PBD was performed. However, it resulted in a finding that was not statistically significant.

Hypothesis Five

The last hypothesis of this study predicted that there would be a positive relationship between the diagnosis of autism spectrum disorder (ASD) and PBD. Out of the 54 candidates, four candidates (N = 4), including their 672 participants (k = 1, 531), met

inclusion criteria (see Table 7). Meta-analyzing the four candidates using a one-variable relationship analysis produced a statistically significant mean effect size prevalence rate of 5.3% comorbidity of ASD and PBD (I^2 = 97.2%; $\overline{ES}\rho$ = 5.33%; 95%CI: 9.2% to 18.9%; $p = 0.04$). The meta-analysis calculations from analyzing four candidates looking at the comorbidity of ASD and PBD resulted in a statistically significant finding. Yielding a comorbidity prevalence rate of ASD and PBD of 5.3%.

Table 7

Hypotheses 2-5: Comorbidity

Hypothesis Number	Comorbid Diagnosis	Candidate Number (*N*)	Participants (*k*)	Random Mean Effect Size Proportion ($\overline{ES}_\rho$)	*p* Values	Confidence Intervals (95% CI)	Heterogeneity Index & Rating (I^2)
2	ADHD	50	4,193	64.8%	0.000	58.0% - 71.1%	92.9% (High)
3	ODD	36	3,169	48%	0.750 Non Signif.	39.6% - 57.6%	94.0% (High)
3	CD	43	3,625	29.0%	0.000	21.4% - 38.0%	95.0% (High)
4	MD	17	1,531	52.8%	0.611 Not Signif.	42.2% - 63.1%	90.1% (High)
5	ASD	4	672	5.3%	0.042	.3% - 47.2%	97.2% (High)

Discussion

It has been the goal of this study to address five hypotheses concerning the symptomatology and comorbidity of PBD. To best address that goal, meta-analyses were chosen as the study's methodology. Within this study, 861 articles on PBD were examined as potential candidates for the meta-analyses, with only 54 meeting full inclusion criteria. Within the 54 candidates, there were 10,318 participants. Overall, 15 meta-analyses were performed. The following discussion is organized by addressing each hypothesis and the meta-analyses used to investigate them.

Hypothesis One

The first hypothesis of this study stated that the symptomatology of PBD would differ from the *DSM-IV-TR* diagnostic criteria for adult bipolar disorder. It quickly became clear during the data collection stage of this study that there appeared to be no research on the overall symptoms of PBD. Instead, there was research focusing on two areas pertaining to this hypothesis, research focusing on partial symptoms of PBD and prevalence rates of diagnostic type. In the research looking at partial symptoms, two discoveries emerged. First, there was a profusion of candidates (journal articles) that studied the age of onset. Second, numerous studies looked at the cardinal symptoms of mania. In the research exploring rates of diagnostic type of PBD there was research on the rates of PBD-I, PBD-II, and PBD-NOS. In addition, there was information on mania episodic types.

A meta-analysis of the overall symptoms of PBD was attempted. In attempting to study the overall symptoms of PBD, it was surprising that there were no empirical studies found out of 861 potential candidates. With there being no comprehensive symptom

research results to analyze, I felt it validated my research question concerning the appropriateness of current diagnostic criteria for PBD. With the lack of empirical studies, it also validated my and other psychologists' concerns around the appropriateness of the current diagnostic criteria. It cannot be stated strong enough that there is need for further research into what constitutes appropriate diagnostic criteria for PBD. This also raises questions regarding the validity of our current PBD diagnoses. This question is important since one out of every 200 children in the U.S. is diagnosed with PBD (Miller, 2007). This may be an underestimation or an overestimation due to underdiagnosis or over diagnosis (Geller & Luby, 1997). Past research has shown that there is no consensus on the diagnostic symptoms (Carlson & Meyer, 2006). The disparate findings of past research likely explains the inability of this study to locate enough data to meta-analyze the comprehensive symptoms of PBD.

A meta-analysis of the age of onset for PBD was performed. While there was not much research on the overall symptoms of PBD, there was much research on the age of onset. While this was not one of my research questions, I felt it might be helpful to collect and analyze existing data on age of onset as part of the controversies around the symptomatology of PBD. As noted earlier in the literature review, there is great disparity in what the typical age of onset is for PBD. In meta-analyzing the data of the 50 candidates who met inclusion criteria, it was found that the mean age of onset for a PBD diagnosis was 8.33 years of age. This finding is supported by some studies, but not by others. In the articles examined for this study, a wide gap was found with the age of onset ranging from 2.8 years of age to 17 years of age. However, more studies reported the age of onset as prepubertal. Part of the discrepancy and limitations may be due to many of the

research studies using historical reports by the parents, which may or may not be accurate. Another factor may be due to parents and clinicians attempting to use behavior modification instead of recognizing that the problem may be pathological. In addition, the comorbidity prevalence most likely contributes to the late or misdiagnosis of PBD.

Three meta-analyses were performed studying the potential cardinal symptoms constituting PBD mania. These were: euphoria, grandiosity, and irritability. To look at each of these symptoms separately three meta-analyses were performed. The first meta-analysis of 24 candidates looking at euphoria found that 67.2% of children with PBD had euphoric symptoms while in a manic episode. The second meta-analysis analyzed 22 candidates studying the rates of grandiosity in children with PBD. From that analysis, it was found that there was a symptom rate of 70.1% occurrence of grandiosity. Both of these figures are important when deciding if euphoria and grandiosity are truly cardinal symptoms of PBD mania since there have been contradicting findings in past research. Wozniak and colleagues (2005), found that 51% of children with PBD displayed euphoria as a symptom and 77% displayed grandiosity when in a manic episode. These findings are similar to the findings of this study. However, other studies report that euphoria and grandiosity have rarely been seen in children with PBD (Blader & Carlson, 2007; Carlson & Meyer, 2006; Wozniak, et al., 2005). With such differing reports, it is important to have the results from a meta-analysis in order to assess a larger sample size. Though it is noteworthy that while a meta-analysis looks at multiple studies, results may be limited due to the typical practice of peer-reviewed journals not publishing research results that do not have significant findings, such as, a rarity of the symptom of euphoria or grandiosity.

The third meta-analysis hypothesized a cardinal symptom of mania in children with PBD may be irritability. The meta-analysis conducted in this study found that 85.5% of children with PBD display irritability as a symptom of mania. Again, the Wozniak, et al (2005) study had similar findings of 77% in prepubertal children with PBD. However, there have been studies that have found 100% in preschool age and adolescent children (Scheffer & Niskala, 2004; Wozniak, et al., 2005). This meta-analysis had no measure for age range unlike the studies previously noted, and this might have contributed to the differences in findings. A limitation that must be highlighted is that there was no control in the candidates' study for a child's ability to regulate their emotions. With this in mind, one must ask if the symptom is irritability or an emotion regulation problem. In addition, many other childhood disorders have irritability as a symptom. With all three hypothesized cardinal symptoms, it would be prudent to conduct further studies with greater controls. Even with further research recommendations it is important for clinicians and researchers to take note of the results of this study when attempting to diagnose PBD.

Three meta-analyses were conducted looking at diagnostic prevalence rates of PBD. The second area of research pertaining to the overall symptoms of PBD is the prevalence rates of diagnostic type. Within this area there were candidate studies looking at the prevalence rates of PBD-I, PBD-II, and PBD-NOS. The meta-analysis on PBD-I resulted in a prevalence rate of 58.2%. This falls within the range of 22.8% - 82.4% found within the literature. The meta-analysis on PBD-II found a rate of 15.0%. This also falls into the range of PBD-II rates found in the literature, which are reported at between 2% to 44.7%. Lastly, the meta-analysis calculating the rates of prevalence for PBD-

NOS, found it to be 31.3%. The literature reported a range of 8.8% - 59.8%. All three meta-analysis were supported by the literature, with their results falling into the ranges as reported in the literature. However, the ranges are so broad that they do not provide a great deal of specificity. With the wide range of prevalence rates of PBD-I, PBD-II, and PBD-NOS found in the literature it lends support to this study's questioning of the appropriateness of current diagnostic criteria for PBD. In addition, the current rates of bipolar disorder type I, II, and NOS in adults are 22.5%, 22.5%, and 55% respectively (Merikangas, et al., 2007). Those rates are within the ranges found in the literature for PBD. However, they are very different from the findings found in the meta-analyses. This may be due to the limitations of the diagnostic criteria for PBD. It may also be influenced by what some researchers have claimed to be PBD-NOS instability (Birmaher, et al., 2006). Further research is needed on the differences between the diagnostic rates of PBD versus adult bipolar disorder. In addition, it would be beneficial to study the potential causal effects of the differences.

Meta-analyses were performed studying the prevalence rates of chronic, rapid, and episodic types of mania in PBD. Three meta-analyses were performed in order to analyze the cycling rates of types of mania in PBD. However, only the rates for rapid and episodic were statistically significant. The findings of those meta-analyses were 29.5% for rapid and 28.5% for episodic. Again, there was a wide range of prevalence rates found in the literature. Rapid cycling rates were 10% - 52%, and episodic was 9.8 % - 80%. While all of the meta-analyses results fell into the ranges found in the literature, the ranges were so wide that it does not lend support or refute this study's findings. As with the prevalence rates of PBD-I, II, and NOS, the prevalence rates for cycling types may be

limited by the inadequate diagnostic criteria or as previously noted, the cycling of children may be so fast it is hard to tell when it occurs (Carlson & Meyer, 2006; Youngstrom, Findling, & Feeny, 2004; Geller & Luby, 1997).

Hypothesis Two

Hypothesis Two of this study proposes that there will be a positive relationship between the diagnostic occurrence of attention-deficit/hyperactivity disorder (ADHD) and PBD. Fifty candidates met inclusion criteria for this meta-analysis. From that analysis, there was a 64.8% ADHD prevalence rate of comorbidity when a child has PBD. This result is supported in the range of 50% - 98% found in the literature. This range is quite broad. This may be due in part to 50% - 57% of children with PBD also fitting the diagnostic criteria for ADHD (Kim & Miklowitz, 2002; Miller, 2007). In addition, 30% of children diagnosed with ADHD have later been diagnosed with PBD (Kim & Miklowitz, 2002; Miller, 2007). A limitation of this meta-analysis is that there is a great deal of overlap in the diagnostic criteria, which would increase the chance for error in making a differential diagnosis.

Hypothesis Three

Hypothesis Three of this study predicted a positive relationship between conduct disorder and PBD. Two meta-analyses were performed looking at the comorbidity prevalence rates of oppositional defiant disorder (ODD) and conduct disorder (CD), with only the CD meta-analysis results found statistically significant. The meta-analysis results for conduct disorder comorbidity found that there was a prevalence of 29%. This result is a little higher than that found in the literature. The literature reported that CD is comorbid with PBD 22% of the time in children and 18% in adolescents. This may have

occurred due to methodological limitations, symptom overlap, and/or rapid cycling which may make it more difficult to make a diagnosis. Nothing in this meta-analysis supported the co-morbidity of ODD with PBD.

Hypothesis Four

Hypothesis four proposes a positive relationship between major depression (MD) and PBD. The meta-analysis on MD resulted in non-significant findings. However, the literature presented a prevalence rate range of 0.6% to 96.2%, which is very broad and shows the need to have a comprehensive study of the comorbidity rates. Again, this large range may be due to the overlap of symptoms and the difficulty in recognizing if the child is having a major depressive episode versus an episode of bipolar (Danielson, et a, 2003).

Hypothesis Five

Hypothesis five states a positive relationship between autism spectrum disorder (ASD) and PBD. The meta-analysis conducted produced a finding of 5.3% comorbidity rates. While the overwhelming reports in the literature report no connection between a diagnosis for ASD and PBD, a 5.3% comorbidity rate was supported in this meta-analysis. A limitation to this finding may be that many of the studies on PBD used ASD as an exclusion criterion. With that in mind, it is very interesting that there would still be such a significant comorbidity rate. As with the other comorbid diagnoses there is symptom overlap that may have increased the difficulty of diagnosis.

Research Implications

Within this research study, all but three of the meta-analyses were statistically significant. So the question is what do these results imply and how might they alter the way clinicians diagnose and treat PBD? In the meta-analyses pertaining to

symptomatology, one of the most important finding was the lack of empirical research on the overall symptoms of PBD. While this lack of empirical research does not resolve my research hypothesis regarding the symptoms of PBD differing from the *DSM-IV-TR* diagnostic criteria for adult bipolar disorder, it has supported the question being asked. In looking at results of the meta-analyses on partial symptoms of PBD it is clear that all of them provided greater clarity on the symptoms being studied. With greater clarity of some of the symptoms of PBD, clinicians have the opportunity to have greater success when diagnosing PBD. In addition, understanding the rates of comorbidity will also help the clinician in their attempt to provide a differential diagnosis.

Overall Research Limitations

While a meta-analysis provides increased ability to summarize quantitative findings, it like any other research methodology, has limitations, which may be evident in this study also. In this research study, there was high heterogeneity in all of the meta-analyses, which limited my analyses to using only random effect sizes. While those are statistically significant, results are based on a wider variety of data, which looks more at the distribution of scores across the studies. Another limitation to this study was the lack of empirical research data on the overall symptoms of PBD. This was surprising considering the potential candidate pool had 861 potential candidates and quickly dwindled down to 54 candidates. A major limitation was no empirical studies on the overall symptoms of PBD. As for internal validity, this study was a relational study that means cause and effect cannot be determined by the manipulation of a variable. External validity is also limited due to the methodological approach used.

Future Directions

After completion of this research, it is apparent that there needs to be more empirically driven research on the symptomatology and comorbidity of PBD. With all of the interest in PBD, as noted by 861 plus research articles on the topic, there is still little empirical research that really defines the phenomenon of pediatric bipolar disorder. It would be beneficial to have more research on the prevalence rates of PBD versus adult bipolar disorder. It would also be helpful to note what may be influencing any differences. As with most research studies replication of this study is encouraged and appreciated.

While this study did not produce results on the overall symptomatology of PBD, it did provide a limited profile of the symptomatology and comorbidity of PBD. From the results of the 15 meta-analyses, it appears that a typical child with PBD would have an average age of onset of 8.33 years of age. That the likelihood the child would demonstrate symptoms of euphoria, grandiosity, and irritability would be 67.2%, 70.1%, and 85.% respectively. The child would have a 58.2% chance of being diagnosed as having PBD-I, a 15% chance of PBD-II, and a 31.1% chance of PBD-NOS. There would also be cycling type prevalence rates of 29.5% rapid cycling type and 28.5% episodic cycling type. As for comorbidity prevalence rates the child would have a 64.8% chance of being diagnosed with PBD and ADHD, 29% with CD, and 5.3% with ASD. Whereas this study did not produce the comprehensive results on the symptomatology and comorbidity of PBD, it did take us one step closer to a more comprehensive and evidence based symptom criteria. Further research will be needed to provide a more complete picture of PBD.

References

*Candidate studies are noted in the reference section with an * at the beginning of each reference citation.*

*Akiskal, H., Downs, J., Jordan, P., Watson, S., Daugherty, D., & Pruitt, D. (1985). Affective disorders in referred children and younger siblings of manic-depressives. mode of onset and prospective course. *Archives of General Psychiatry, 42*(10), 996-1003.

Aman, M. G., DeSmedt, G., Derivan, A., Lyons, B., & Findling, R. L. (2002). Double-blind, placebo-controlled, study of risperidone for the treatment of disruptive behaviors in children with subaverage intelligence. *American Journal of Psychiatry, 159*(8), 1337-1346.

American Psychiatric Association. (1968). *Diagnostic and statistical manual of mental disorders* (2nd ed. ed.). Washington, DC: Author.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision ed.). Washington, DC: Author.

Anthony, E. J., & Scott, P. (1960). Manic-depressive psychosis in childhood. *Journal of Child Psychology and Psychiatry, 1*, 53-72.

*Axelson, D., Birmaher, B., Strober, M., Gill, M., Valeri, S., Chiappetta, L., et al. (2006). Phenomenology of children and adolescents with bipolar spectrum disorders. *Archives of General Psychiatry, 63*(10), 1139-1148.

Biederman, J., Faraone, S. V., Mick, E., Wozniak, J., Chen, L., Ouellette, C., et al. (1996). Attention-deficit hyperactivity disorder and juvenile mania: An overlooked comorbidity? *Journal of the American Academy of Child and Adolescent Psychiatry, 35*(8), 997-1008.

*Biederman, J., Faraone, S. V., Wozniak, J., Mick, E., Kevon, A., Cayton, G. A., et al. (2005). Clinical correlates of bipolar disorder in a large, referred sample of children and adolescents. *Journal of Psychiatric Research, 39*(6), 611-622.

*Biederman, J., Faraone, S. V., Wozniak, J., Mick, E., Kwon, A., & Aleardi, M. (2004). Further evidence of unique developmental phenotypic correlates of pediatric bipolar disorder: Findings from a large sample of clinically referred preadolescent children assessed over the last 7 years. *Journal of Affective Disorders, 82*, S45-S58.

*Biederman, J., Kwon, A., Wozniak, J., Mick, E., Markowitz, S., Fazio, V., et al. (2004). Absence of gender differences in pediatric bipolar disorder: Findings from a large sample of referred youth. *Journal of Affective Disorders, 83*(2-3), 207-214.

*Biederman, J., Mick, E., Faraone, S. V., Van Patten, S., Burback, M., & Wozniak, J. (2004). A prospective follow-up study of pediatric bipolar disorder in boys with attention-deficit/hyperactivity disorder. *Journal of Affective Disorders, 82*, S17-S23.

*Biederman, J., Mick, E., Spencer, T., Dougherty, M., Aleardi, M., & Wozniak, J. (2007). A prospective open-label treatment trial of ziprasidone monotherapy in children and adolescents with bipolar disorder. *Bipolar Disorders, 9*(8), 888-894.

*Birmaher, B., Axelson, D., Strober, M., Gill, M. K., Valeri, S., Chiappetta, L., et al. (2006). Clinical course of children and adolescents with bipolar spectrum disorders. *Archives of General Psychiatry, 63*(2), 175-365.

Blader, J. C. (2006). Which family factors predict children's externalizing behaviors following discharge from psychiatric inpatient treatment? *Journal of Child Psychology and Psychiatry, 47*(11), 1133-1142.

Blader, J. C., & Carlson, G. A. (2007). Increased rates of bipolar disorder diagnoses among U.S. child, adolescent, and adult inpatients, 1996-2004. *Biological Psychiatry, 62*(2), 107-114.

Borenstein M, Hedges L, Higgins J, & Rothstein H. (2005). *Comprehensive meta-analysis version 2*, Englewood NJ: Biostat.

Carlson, G. A. (2002). *Bipolar disorder in children and adolescents: A critical review*. Washington, DC: American Psychiatric Publishing, Inc.

Carlson, G. A. (2005). Early onset bipolar disorder: Clinical and research considerations. *Journal of Clinical Child and Adolescent Psychology, 34*(2), 333-343.

Carlson, G. A., & Meyer, S. E. (2006). Phenomenology and diagnosis of bipolar disorder in children, adolescents, and adults: Complexities and developmental issues. *Development and Psychopathology, 18*(4), 939-969.

Carlson, G. A., & Strober, M. (1978). Manic depressive illness in early adolescence: A study of clinical and diagnostic characteristics in six cases. *Journal of the American Academy of Child Psychiatry, 17*, 138-153.

Carlson, G., & Kelly, K. (1998). Manic symptoms in psychiatrically hospitalized children- what do they mean? *Journal of Affective Disorders, 51*, 123-135.

Coyle, J. T., Pine, D. S., Charney, D. S., Lewis, L., Nemeroff, C. B., Carlson, G. A., et al. (2003). Depression and bipolar support alliance consensus statement on the unmet needs in diagnosis and treatment of mood disorders in children and adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 42*(12), 1494-1503.

Danielson, C. K., Youngstrom, E. A., Findling, R. L., & Calabrese, J. R. (2003). Discriminative validity of the general behavior inventory using youth report. *Journal of Abnormal Child Psychology, 31*(1), 29-39.

Danielyan, A., Pathak, S., Kowatch, R. A., Arszman, S. P., & Johns, E. S. (2007). Clinical characteristics of bipolar disorder in very young children. *Journal of Affective Disorders, 97*(1-3), 51-59.

*Dickstein, D. P., Rich, B. A., Binstock, A. B., Pradella, A. G., Towbin, K. E., Pine, D. S., et al. (2005). Comorbid anxiety in phenotypes of pediatric bipolar disorder. *Journal of Child and Adolescent Psychopharmacology, 15*(4), 534-548.

*Faedda, G. L., Baldessarini, R. J., Glovinsky, I. P., & Austin, N. B. (2004). Pediatric bipolar disorder: Phenomenology and course of illness. *Bipolar Disorders, 6*(4), 305-313.

*Faedda, G. L., Baldessarini, R. J., Glovinsky, I. P., & Austin, N. B. (2004). Treatment-emergent mania in pediatric bipolar disorder: A retrospective case review. *Journal of Affective Disorders, 82*(1), 149-158.

Faraone, S. V., Biederman, J., Wozniak, J., Mundy, E., Mennin, D., & O'Donnell, D. (1997). Is comorbidity with ADHD a marker for juvenile-onset mania? *Journal of the American Academy of Child and Adolescent Psychiatry, 36*(8), 1046-1055.

*Findling, R. L., Graious, B. L., McNamara, N. K., Youngstrom, E. A., Demeter, C. A., Branicky, L. A., et al. (2001). Rapid, continuous cycling and psychiatric co-morbidity in pediatric bipolar I disorder. *Bipolar Disorders, 3*(4), 202-210.

Geller, B., Craney, J. L., Bolhofner, K., DelBello, M. P., Williams, M., & Zimerman, B. (2001). One-year recovery and relapse rates of children with a prepubertal and early adolescent bipolar disorder phenotype. *American Journal of Psychiatry, 158*(2), 303-305.

Geller, B., & Luby, J. (1997). Child and adolescent bipolar disorder: A review of the past 10 years. *Journal of the American Academy of Child & Adolescent Psychiatry, 36*(9), 1168-1176.

Geller, B., Zimerman, B., Williams, M., Delbello, M. P., Bolhofner, K., Craney, J. L., et al. (2002). DSM-IV mania symptoms in a prepubertal and early adolescent bipolar disorder phenotype compared to attention-deficit hyperactive and normal controls. *Journal of Child and Adolescent Psychopharmacology, 12*(1), 11-25.

Geller, B., Zimerman, B., Williams, M., Delbello, M. P., Frazier, J., & Beringer, L. (2002). Phenomenology of prepubertal and early adolescent bipolar disorder: Examples of elated mood, grandiose behaviors, decreased need for sleep, racing

thoughts and hypersexuality. *Journal of Child and Adolescent Psychopharmacology, 12*(1), 3-9.

*Geller, B., Tillman, R., MS, Bolhofner, K., BS, & Zimerman, B., MA. (2008). Child bipolar I disorder. *Archives of General Psychiatry, 65*(10), 1125-1133.

Geller, B. (1994). Rate and predictors of prepubertal bipolarity during follow-up of 6- to 12-year-old depressed children. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*(4), 461-468.

*Geller, B., Craney, J. L., Bolhofner, K., Nickelsburg, M. J., Williams, M., & Zimerman, B. (2002). Two-year prospective follow-up of children with a prepubertal and early adolescent bipolar disorder phenotype. *The American Journal of Psychiatry, 159*(6), 927-933.

*Geller, B., Tillman, R., Craney, J. L., & Bolhofner, K. (2004). Four-year prospective outcome and natural history of mania in children with a prepubertal and early adolescent bipolar disorder phenotype. *Archives of General Psychiatry, 61*(5), 459-467.

*Geller, B., Zimerman, B., Williams, M., Bolhofner, K., Craney, J. L., DelBello, M. P., et al. (2000). Diagnostic characteristics of 93 cases of a prepubertal and early adolescent bipolar disorder phenotype by gender, puberty and comorbid attention deficit hyperactivity disorder. *Journal of Child and Adolescent Psychopharmacology, 10*(3), 157-164.

*Geller, B., Zimerman, B., Williams, M., Bolhofner, K., Craney, J. L., DelBello, M. P., et al. (2000). Six-month stability and outcome of a prepubertal and early adolescent bipolar disorder phenotype. *Journal of Child and Adolescent Psychopharmacology, 10*(3), 165-173.

*Glahn, D. C., Bearden, C. E., Caetano, S., Fonseca, M., Najt, P., Hunter, K., et al. (2005). Declarative memory impairment in pediatric bipolar disorder. *Bipolar Disorders, 7*(6), 546-554.

*Goldstein, B. I., & Levitt, A. J. (2006). Further evidence for a developmental subtype of bipolar disorder defined by age at onset: Results from the national epidemiologic survey on alcohol and related conditions. *American Journal of Psychiatry, 163*(9), 1633-1636.

*Goldstein, T. R., Axelson, D. A., Birmaher, B., & Brent, D. A. (2007). Dialectical behavior therapy for adolescents with bipolar disorder: A 1-years open trial. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*(7), 820-830.

Gutkovich, Z. A., Carlson, G. A., Carlson, H. E., Coffey, B., & Wieland, N. (2007). Advanced pediatric psychopharmacology: Asperger's disorder and co-morbid

bipolar disorder: Diagnostic and treatment challenges. *Journal of Child and Adolescent Psychopharmacology, 17*(2), 247-255.

Gutterman, E. M. (1998). Is diagnosis relevant in the hospitalization of potentially dangerous children and adolescents? *Journal of the American Academy of Child and Adolescent Psychiatry, 37*(10), 1030-1037.

Harpaz-Rotem, I., & Rosenheck, R. A. (2004). Changes in outpatient psychiatric diagnosis in privately insured children and adolescents from 1995 to 2000. *Child Psychiatry and Human Development, 34*(4), 329-340.

*Harpold, T. L., Wozniak, J., Kwon, A., Gilbert, J., Wood, J., Smith, L., et al. (2005). Examining the association between pediatric bipolar disorder and anxiety disorders in psychiatrically referred children and adolescents. *Journal of Affective Disorders, 88*(1), 19-26.

Higgins, J. P., Thompson, S. G., Deeks, J. J., Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *BMJ, 327*(7414), 557-560.

Huedo-Medina, T. B., Sanchez-Meca, J., Martin-Martinez, F., & Botella, J. (2006). Assessing heterogeneity in Meta-analysis: Q statistic or I^2 Index? *Psychological Methods, 11*(2), 193-206.

*Kahana, S. Y., Youngstrom, E. A., Findling, R. L., & Calabrese, J. R. (2003). Employing parent, teacher, and youth self-report checklists in identifying pediatric bipolar spectrum disorders: An examination of diagnostic accuracy and clinical utility. *Journal of Child and Adolescent Psychopharmacology, 13*(4), 471-488.

Kim, E. Y., & Milklowitz, D. J. (2002). Childhood mania, attention deficit hyperactivity disorder and conduct disorder: A critical review of diagnostic dilemmas. *Bipolar Disorder, 4*, 215-225.

Kim, J. S. (2008). Examining the effectiveness of solution-focused brief therapy: A meta-analysis. *Research on Social Work Practice, 18*(2), 107-116.

Kluger, J., & Song, S. (2002). Young and bipolar. *Time, 51*, 39-47.

Kovacs, M., & Post, M. (1995). Bipolar disorder and comorbid conduct disorder in childhood and adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*(6), 715-723.

Kyte, Z. A., Carlson, G. A., & Goodyer, I. M. (2006). Clinical and neuropsychological characteristics of child and adolescent bipolar disorder. *Psychological Medicine, 36*(9), 1197-1211.

Lange, K. J., & McInnis, M. G. (2002). Studies of anticipation in bipolar affective disorder. *Center for Nonproliferation Studies, 7*(3), 196-202.

*Lázaro, L., Castro-Fornieles, J., de la Fuente, J., Baeza, I., Morer, A., & Pàmias, M. (2007). Differences between prepubertal- versus adolescent- onset bipolar disorder in a spanish clinical sample. *European Child & Adolescent Psychiatry, 16*(8), 510-516.

*Lee, J. H., & Dunner, D. L. (2008). The effect of anxiety disorder comorbidity on treatment resistant bipolar disorders. *Depression and Anxiety, 25*(2), 91-97.

Leibenluft, E., Charney, D. S., Towbin, K. E., Bhangoo, R. K., & Pine, D. S. (2003). Defining clinical phenotypes of juvenile mania. *American Journal of Psychiatry, 160*(3), 430-437.

*Leverich, G., Post, R., Keck, P., Jr., Altshuler, L., Frye, M., Kupka, R., et al. (2007). The poor prognosis of childhood-onset bipolar disorder. *The Journal of Pediatrics, 150*(5), 485-490.

*Lewinsohn, P. M., Klein, D. N., & Seeley, J. R. (1995). Bipolar disorders in a community sample of older adolescents: Prevalence, phenomenology, comorbidity, and course. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*(4), 454-463.

*Leyfer, O. T., Folstein, S. E., Bacalman, S., Davis, N. O., Dinh, E., Morgan, J., et al. (2006). Comorbid psychiatric disorders in children with autism: Interview development and rates of disorders. *Journal of Autism Developmental Disorder, 36*(7), 849-861.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks, California: Sage Publications.

*Luby, J., & Belden, A. (2006). Defining and validating bipolar disorder in the preschool period. *Development and Psychopathology, 18*(4), 971-988.

*Marchand, W. R., Wirth, L., & Simon, C. (2006). Delayed diagnosis of pediatric bipolar disorder in a community mental health setting. *Journal of Psychiatric Practice, 12*(2), 128-133.

Mash, E. J., & Barkley, R. A. (2007). *Assessment of childhood disorders* (4th ed. ed.). New York: Guilford.

*Masi, G., Perugi, G., Millepiedi, S., Mucci, M., Pari, C., Pfanner, C., et al. (2007). Clinical implications of DSM-IV subtyping of bipolar disorders in referred children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*(10), 1299-1306.

*Masi, G., Perugi, G., Toni, C., Millepiedi, S., Mucci, M., Bertin, N., et al. (2006). Attention-deficit hyperactivity disorder - bipolar comorbidity in children and adolescents. *Bipolar Disorders, 8*(4), 373-381.

Merikangas, K. R., Akiskal, H. S., Angst, J., Greenberg, P. E., Hirschfeld, R. M., Petukhova, M. , et al. (2007). Lifetime and 12-month prevalence of bipolar spectrum disorder in the national comorbidity survey replication. *Achieves of General Psychiatry, 64,* 543-552.

Meyer, S. E., Carlson, G. A., Wiggs, E. A., Martinez, P. E., Ronsaville, D. S., Klimes-Dougan, B., et al. (2004). A prospective study of the association among impaired executive functioning, childhood attentional problems, and the development of bipolar disorder. *Development and Psychopathology, 16*(2), 461-476.

*Mick, E., Biederman, J., Faraone, S. V., Murray, K., & Wozniak, J. (2003). Defining a developmental subtype of bipolar disorder in a sample of nonreferred adults by age at onset. *Journal of Child and Adolescent Psychopharmacology, 13*(4), 453-462.

Milberger, S., Biederman, J., Faraone, S. V., Murphy, J., & Tsuang, M. T. (1995). Attention deficit hyperactivity disorder and comorbid disorders: Issues of overlapping symptoms. *American Journal of Psychiatry, 152*(12), 1793-1799.

Miller, M. C. (Ed.). (2007). Bipolar disorder in children: Difficult to diagnose, important to treat. *Harvard Mental Health Letter, 23*(11), 1-4.

*Moreno, C., Laje, G., Blanco, C., Jiang, H., Schmidt, A. B., & Olfson, M. (2007). National trends in the outpatient diagnosis and treatment of bipolar disorder in youth. *Archives of General Psychiatry, 64*(9), 1032-1039.

Nicholson, J., Young, S. D., Simon, L. J., Fisher, W. H., & Bateman, A. (1998). Privatized Medicaid managed care in Massachusetts: Disposition in child and adolescent mental health emergencies. *Journal of Behavioral Health Services & Research, 25*(3), 279-292.

Papolos, D. F. (1999). *The bipolar child: The definitive and reassuring guide to childhood's most misunderstood disorder*. New York: Braodway Books.

*Patel, N. C., Delbello, M. P., Keck, P., Jr., & Strakowski, S. M. (2006). Phenomenology associated with age at onset in patients with bipolar disorder at their first psychiatric hospitalization. *Bipolar Disorders, 8*(1), 91-94.

*Pavuluri, M. N., Graczyk, P. A., Henry, D. B., Carbray, J. A., Heidenreich, J., & Miklowitz, D. J. (2004). Child- and family-focused cognitive-behavioral therapy for pediatric bipolar disorder: Development and preliminary results. *Journal of the American Academy of Child and Adolescent Psychiatry, 43*(5), 528-537.

*Pavuluri, M. N., Henry, D. B., Devineni, B., Carbray, J. A., & Birmaher, B. (2006). Child mania rating scale: Development, reliability, and validity. *Journal of the American Academy of Child and Adolescent Psychiatry, 45*(5), 550-560.

Post, R. M., Findling, R. L., & Kowatch, R. A. (2006). Earlier recognition and treatment of prepubertal-onset bipolar disorder. *Psychiatric Annals, 36*(9), 630-636.

*Post, R. M., & Kowatch, R. A. (2006). The health care crisis of childhood-onset bipolar illness: Some recommendations for its amelioration. *Journal of Clinical Psychiatry, 67*(1), 115-125.

Reber, A. S., & Reber, E. (2001). *The penguin dictionary of psychology* (3rd ed. ed.). London: Penguin Books.

*Rende, R., Birmaher, B., Axelson, D., Strober, M., Gill, M. K., Valeri, S., et al. (2006). Psychotic symptoms in pediatric bipolar disorder and family history of psychiatric illness. *Journal of Affective Disorders, 96*(1-2), 127-131.

*Rende, R., Birmaher, B., Axelson, D., Strober, M., Gill, M. K., Valeri, S., et al. (2007). Childhood-onset bipolar disorder: Evidence for increased familial loading of psychiatric illness. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*(2), 197-204.

*Rucklidge, J. J. (2008). Retrospective parent report of psychiatric histories: Do checklists reveal specific prodromal indicators for postpubertal-onset pediatric bipolar disorder? *Bipolar Disorders, 10*(1), 56-66.

*Scheffer, R. E., & Apps, J. A. N. (2004). The diagnosis of preschool bipolar disorder presenting with mania: Open pharmacological treatment. *Journal of Affective Disorders, 82*, S25-S34.

*Schenkel, L. S., West, A. E., Harral, E. M., Patel, N. B., & Pavuluri, M. N. (2008). Parent-child interactions in pediatric bipolar disorder. *Journal of Clinical Psychology, 64*(4), 422-437.

Staton, D., Odden, R. L., & Volness, L. J. (2004). Defining subtypes of childhood bipolar illness. *Journal of the American Academy of Child & Adolescent Psychiatry, 43*(1), 2-3.

*Staton, D., Volness, L. J., & Beatty, W. W. (2008). Diagnosis and classification of pediatric bipolar disorder. *Journal of Affective Disorders, 105*(1-3), 205-212.

Strober, M., & Carlson, G. (1982). Bipolar illness in adolescents with major depression: Clinical, genetic, and psychopharmacologic predictors in a three- to four-year prospective follow-up investigation. *Archives of General Psychiatry, 39*, 549-555.

Strober, M., Schmidt-Lackner, S., Freeman, R., Bower, S., Lampert, C., & De Antonio, M. (1995). Recovery and relapse in adolescents with bipolar affective illness: A five-year naturalistic prospective follow-up. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*(6), 724-731.

*Tillman, R., & Geller, B. (2007). Diagnostic characteristics of child bipolar I disorder: Does the "treatment of early age mania (TEAM)" sample generalize? *Journal of Clinical Psychiatry, 68*(2), 307-314.

*Tillman, R., Geller, B., Bolhofner, K., Craney, J. L., Williams, M., & Zimerman, B. (2003). Ages of onset and rates of syndromal and subsyndromal comorbid DSM-IV diagnoses in a prepubertal and early adolescent bipolar disorder phenotype. *Journal of the American Academy of Child and Adolescent Psychiatry, 42*(12), 1486-1493.

*Tillman, R., Geller, B., Craney, J. L., Bolhofner, K., Williams, M., & Zimerman, B. (2004). Relationship of parent and child informants to prevalence of mania symptoms in children with a prepubertal and early adolescent bipolar disorder phenotype. *American Journal of Psychiatry, 161*(7), 1278-1284.

*Tillman, R., Geller, B., Klages, T., Corrigan, M., Bolhofner, K., & Zimerman, B. (2008). Psychotic phenomena in 257 young children and adolescents with bipolar I disorder: Delusions and hallucinations (benign and pathological). *Bipolar Disorders, 10*(1), 45-55.

*Towbin, K. E., Pradella, A., Gorrindo, T., Pine, D. S., & Leibenluft, E. (2005). Autism spectrum traits in children with mood and anxiety disorders. *Journal of Child and Adolescent Psychopharmacology, 15*(3), 452-464.

*Tumuluru, R. V., Weller, E. B., Fristad, M. A., & Weller, R. A. (2003). Mania in six preschool children. *Journal of Child and Adolescent Psychopharmacology, 13*(4), 489-494.

*West, A. E., Schenkel, L. S., & Pavuluri, M. N. (2008). Early childhood temperament in pediatric bipolar disorder and attention deficit hyperactivity disorder. *Journal of Clinical Psychology, 64*(4), 402-421.

*West, S. A., McElroy, S. L., Strakowski, S. M., Keck, P.,Jr, & McConville, B. J. (1995). Attention deficit hyperactivity disorder in adolescent mania. *American Journal of Psychiatry, 152*(2), 271-273.

Wozniak, J., Biederman, J., Kiely, K., Ablon, J. S., Faraone, S. V., Mundy, E., et al. (1995). Mania-like symptoms suggestive of childhood-onset bipolar disorder in clinically referred children. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*(7), 867-876.

*Wozniak, J., Biederman, J., Kwon, A., Mick, E., Faraone, S., Orlovsky, K., et al. (2005). How cardinal are cardinal symptoms in pediatric bipolar disorder? An examination of clinical correlates. *Biological Psychiatry, 58*(7), 583-588.

*Wozniak, J., Spencer, T., Biederman, J., Kwon, A., Monuteaux, M., Rettew, J., et al. (2004). The clinical characteristics of unipolar vs. bipolar major depression in ADHD youth. *Journal of Affective Disorders, 82*, S59-S69.

Youngerman, J., & Canino, I. A. (1978). Lithium carbonate use in children and adolescents. A survey of the literature. *Archives of General Psychiatry, 35*, 216-224.

Youngstrom, E. A., Findling, R. L., & Feeny, N. (2004). *Assessment of bipolar spectrum disorders in children and adolescents*. New York: Guilford Press.

*`Youngstrom, E., Youngstrom, J. K., & Starr, M. (2005). Bipolar diagnoses in community mental health: Achenbach child behavior checklist profiles and patterns of comorbidity. *Biological Psychiatry, 58*(7), 569-575.

APPENDIX A

Database Search Matrix

Database Search Matrix

ID	Title	Search Protocol
7	Psych Info	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
1	ProQuest	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
2	PsychLit	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
4	CINAHL	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
3	MEDLINE	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
5	Psych & Behv Sciences	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
9	EJC	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
10	Fam. Resources	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
11	Fed. Res.	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
12	Health Peri.	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
13	Int. Pharm.	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
14	Mental Health	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
15	SSCI	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
16	WEB of Science	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
17	PsycARTICLES	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
18	JSTOR	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
19	ScienceDirect	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
20	Journal Citation Repts.	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
21	SOCIOLOGICAL	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
22	CQ Researcher	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
23	Intern. Ency. Social & Beh.	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
24	HealthLinks eJournal	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks
26	Expanded Academic Index	Search Titles, Enter Titles, Order, Print, Query 1, Query 2, RefWorks

APPENDIX B

Search Word Matrix Sample

Search Word Matrix Sample

Psych Info K = Keyword Search	**Psych Info** T = Thesaurus Search
K-Chil* Bipolar , Quantitative	T-Chil* Bipolar, Quantitative
K-Chil* Bipolar, Sx, Quantitative	T-Chil* Bipolar, Sx, Quantitative
K-Chil* Bipolar, Co-Occuring, Quantitative	T-Chil* Bipolar, Co-Occuring, Quantitative
K-Chil* Bipolar, Comorbid, Quantitative	T-Chil* Bipolar, Comorbid, Quantitative
K-Pedi* Bipolar, Quantitative	T-Pedi* Bipolar, Quantitative
K-Pedi* Bipolar, Sx, Quantitative	T-Pedi* Bipolar, Sx, Quantitative
K-Pedi* Bipolar, Co-occuring, Quantitative	T-Pedi* Bipolar, Co-occuring, Quantitative
K-Pedi* Bipolar, comorbid, Quantitative	T-Pedi* Bipolar, Comorbid, Quantitative
K-Manic+Chil* Bipolar , Quantitative	T-Manic+Chil* Bipolar, Quantitative
K-Manic+Pedi* Bipolar, Quantitative	T- Manic+Pedi* Bipolar, Quantitative
K-Prevalence+Chil* Bipolar , Quantitative	T-Prevalence+Chil* Bipolar, Quantitative
K-Prevalence+Pedi* Bipolar, Quantitative	T-Prevalence+Pedi* Bipolar, Quantitative
K-Adolescents+Chil* Bipolar , Quantitative	T-Adolescents+Chil* Bipolar , Quantitative
K-Adolescents+Chil* Bipolar, Sx, Quantitative	T-Adolescents+Chil* Bipolar, Sx, Qnt
K-Adolescents+Chil* Biplr, Co-Occuring, Qnt	T-Adolesc+Chil* Biplr, Co-Occuring, Qnt
K-Adolescents+Chil* Bipolar, Comorbid, Qnt	T-Adolescents+Chil* Biplr, Comorbid, Qnt
K-Adolescents+Pedi* Bipolar, Quantitative	T-Adolescents+Pedi* Bipolar, Quantitative
K-Adolescents+Pedi* Bipolar, Sx, Qnt	T-Adolescents+Pedi* Bipolar, Sx, Qnt
K-Adolescents+Pedi* Biplr, Co-occuring, Qnt	T-Adolescts+Pedi* Biplr, Co-occuring, Qnt

K-Adolescents+Pedi* Bipolar, comorbid, Qnt	T-Adolescts+Pedi* Bipolar, comorbid, Qnt
K-Diagnostic Criteria+Chil* Bipolar , Qnt	T-Diagnostic Criteria+Chil* Bipolar , Qnt
K-Diagnostic Criteria+Chil* Bipolar, Sx, Qnt	T-Diagnostic Criteria+Chil* Bipolar, Sx, Qnt
K-Dx Criteria+Chil* Biplr, Co-Occuring, Qnt	T-Dx Criteria+Chil* Biplr,Co-Occuring, Qnt
K-Dx Criteria+Chil* Biplr, Comorbid, Qnt	T-Dx Criteria+Chil* Biplr, Comorbid, Qnt
K-Dx Criteria+Pedi* Bipolar, Quantitative	T-Diagnostic Criteria+Pedi* Bipolar, Qnt
K-Diagnostic Criteria+Pedi* Bipolar, Sx, Qnt	T-Dx Criteria+Pedi* Bipolar, Sx, Qnt
K-Dx Criteria+Pedi* Biplr, Co-occuring, Qnt	T-DxCriteria+Pedi* Biplr, Co-occuring, Qnt
K-Dx Criteria+Pedi* Bipolar, comorbid, Qnt	T-Dx Criteria+Pedi* Biplr,comorbid, Qnt
K-ADHD+Chil* Bipolar , Quantitative	T-ADHD+Chil* Bipolar , Quantitative
K-ADHD+Pedi* Bipolar, Quantitative	T-ADHD+Pedi* Bipolar, Quantitative
K-Conduct Disorder+Chil* Bipolar , Qnt	T-Conduct Disorder+Chil* Bipolar , Qnt
K-Conduct Disorder+Pedi* Bipolar, Qnt	T-Conduct Disorder+Pedi* Bipolar, Qnt
K-Oppsitional Defiant Disr+Chil* Bipolar , Qnt	T-Oppsitionl Defiant Disr+Chil* Biplr , Qnt
K-Oppsitional Defiant Disr+Pedi* Bipolar, Qnt	T-Oppsitionl Defiant Disr+Pedi* Biplr, Qnt
K-Disruptive Behavior+Chil* Bipolar , Qnt	T-Disruptive Behavior+Chil* Bipolar , Qnt
K-Disruptive Behavior+Pedi* Bipolar, Qnt	T-Disruptive Behavior+Pedi* Bipolar, Qnt
K-Autism Spectrum Disr, Adolescent, Bipolar	T-Autism Spectrum Disr, Adolesct, Bipolar
K-Autism Spectrum Disorder, Chil* Bipolar	T-Autism Spectrum Disorder, Chil* Bipolar
K-Autism Spectrum Disorder, Pedi* Bipolar	T-Autism Spectrum Disrder, Pedi* Bipolar
K-Autism Spectrm Disr, Children & Yth Biplr	T-Autism Spectrm Disr, Childrn & Yth Biplr

APPENDIX C

Candidate Pool Matrix Sample

Candidate Pool Matrix Sample

ID	Refworks ID#	Author's Last Name	First Name	Publication Year	Title	2nd Author	3rd Author	Database
788	141	Akiskal	HS	1985	Affective disorders in referred children and younger siblings of manic-depressives. Mode of onset and prospective course	Downs	Jordan	5
525		Albanese	Mark	2004	The Bipolar Patient with Comorbid Substance Use Disorder: Recognition and Management	Pies		3
187		Alegría	Margarita	2008	Prevalence of Mental Illness in Immigrant and Non-Immigrant U.S. Latino Groups	Canino	Shrout	2
478		Abboud	Leila	2005	Treating children for bipolar disorder			2

APPENDIX D

Potential Candidate Survey #1

Potential Candidate Survey #1

ID#: _____ Source: _____ Keywords Srched: _____

Authors: _____

Title: _____

Journal/Publisher: _____

Submitted Keywords: _____

Hypotheses: _____

Sample: _____N=_____

Research Design: _____

Statistical Framework: _____

_____

Sx Categories: _____

Dx Categories: _____

Major Findings: _____

_____

Citation/Abstract in Refworks? _____/_____ Citation in ACCESS? _____

# of References to Search?____ References in ACCESS? ____, ____, ____, ____,

____, ____, ____, ____, ____, ____, ____, ____, ___, ____, ____, ____, ____, ____, ___

Comments: _____

_____

_____

_____

Candidate Status: *Denied*____, *Lit Review*, ____, *Undetermined*____, *Accepted*____

APPENDIX E

Potential Candidate Survey #2

Potential Candidate Survey #2

ID#: _____
Authors:
_____
Title:
_____
Journal/Publisher:
_____

1. Distinguishing Features of Study:

   _____

2. Research Respondents:

   _____

3. Key Variables:

   _____

4. Research Design/Stats Used:

   _____

5. Cultural Linguistic Range:

   _____

6. Citation in Refworks? Yes _____ No_____
7. Citation in Access? Yes_____ No_____
8. Abstract in Refworks? Yes_____ No_____
9. Retrieval Source: _____ Keywords Searched: _____
10. Candidate Moved to Coding Database: Yes _____ No_____
11. Candidate Coded: Yes _____ No_____
12. # of References: _____Ref. Input? Yes_____ No_____