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## Cost-Effectiveness of Treating Pervasive Developmental Disorders: A Comparison by Treatment Modality

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Cost-Effectiveness of Treating Pervasive Developmental Disorders:

A Comparison by Treatment Modality

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A thesis submitted to the faculty of  
Brigham Young University  
in partial fulfillment of the requirements for the

Masters of Science

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## ABSTRACT

### Cost Effectiveness of Treating Pervasive Developmental Disorders: A Comparison by Treatment Modality

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This study examined the costs of pervasive developmental disorder (PDD) treatment in a large healthcare organization. When compared to individual therapy and mixed therapy, family therapy had significantly fewer sessions, fewer episodes of care, and better cost-effectiveness. Individual therapy had significantly shorter treatment length than mixed therapy. There were no differences in treatment length or number of episodes by license, but dropout and cost-effectiveness were significantly different. Medical doctors had the highest dropout and best cost-effectiveness, while Marriage and Family Therapists had the lowest dropout and Masters of Social Work had the poorest cost-effectiveness. Children had significantly higher dropout than other age groups. An autism diagnosis was associated with fewer sessions but additional episodes of care when compared to PDD. Having a comorbid diagnosis is associated with longer treatment length but slightly fewer episodes of care. A regression model to predict number of episodes of care by intensity of treatment, provider type, and modality, intensity of treatment explained only 6% of the variance.

Keywords: pervasive developmental disorder, autism, cost effectiveness, family therapy, individual therapy

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## **Introduction**

Pervasive Developmental Disorders are becoming increasingly prevalent, and are currently being redefined (APA, 2011; Kogan et al., 2009; Wang & Leslie, 2010). Pervasive Developmental Disorders (PDD) are life-long developmental disabilities characterized by impaired social skills, impaired communication skills, and stereotyped behavior, interests, or activities (APA, 2000). Treatment of these disorders is complicated by comorbid disorders and symptom changes across the lifespan (Leyfer et al, 2006; Seltzer, Shattuck, Abbeduto & Breenberg, 2004). Individual therapy, family therapy, special education, speech therapy and occupational therapy are commonly used to help the individuals and families affected by these disorders to develop and improve coping skills. However, research on the cost-effectiveness and trends of use of many of these treatments, particularly of family therapy, has been limited. Additional information on the use, outcomes and cost effectiveness of these treatments is increasingly in demand (de Rivera, 2008). The current study is an assessment of trends in treatment in this population. This study will assess the use, cost, and cost effectiveness of individual, family and mixed therapy in the real world of managed care.

### **Definition Changes, Prevalence and Cost**

In the current edition of the DSM and ICD, “pervasive developmental disorder” is the umbrella category for autistic disorder, Asperger's disorder, Rett's syndrome, childhood disintegrative disorders, pervasive developmental disorder – NOS, atypical autism and overactive disorder associated with mental retardation and stereotyped movements (it most commonly includes autism and pervasive developmental disorder-not otherwise specified; APA, 2000; WHO, 1990). However, in the DSM-V, the umbrella category will likely be changed to “Autism Spectrum Disorder,” and all other diagnoses will be subsumed under it (APA, 2011).



This is considered appropriate because: 1) there is reliable differentiation between PDD and non-PDD conditions, but differentiation between PDD subtypes is less reliable, and 2) a single diagnostic category better reflects clinical presentation, as all pervasive developmental disorders are defined by one common set of behaviors (APA, 2011; Kurita, 2011). Additionally, a study of parent-reported symptoms of 8,911 children with an autism spectrum disorder and 5,836 children without an autism spectrum disorder indicates that the proposed DSM-V diagnosis would lead to superior specificity relative to DSM-IV-TR criteria (Frazier et al., 2012).

These adjustments in the definition of the diagnoses are particularly relevant because of the increasing rates of pervasive developmental disorders. Based on a review of 61 studies completed between 1966 and 2010, the prevalence rate of PDD is approximately 70 out of 10,000 people (Saracino, Noseworthy, Steiman & Reisinger, 2010). Recent studies have estimated that the prevalence may be as high as 110 out of 10,000 people (Kogan et al., 2009). The prevalence of the autism spectrum disorder (ASD) diagnosis in particular has risen significantly over recent decades, and continues to rise (Kogan et al., 2009; Wang & Leslie, 2010). This steady increase may be due to an expansion of diagnostic criteria, increased awareness, improved detection, and increased availability of services (Saracino, Noseworthy, Steiman & Reisinger, 2010; US Department of Education, 2007).

Pervasive developmental disorders have significant costs to quality of life both for the individuals with PDD and their family members. Few disabilities are as exacting of caregivers as pervasive developmental disorders (Schieve, Blumberg, Rice, Visser & Boyle, 2007). Parents of children with autism have higher stress levels than both parents of typically-developing children and parents of children with Down syndrome (Brobst, Clopton & Hendrick, 2009; Dabrowska & Pisula, 2010). Family members of children with autism are significantly more likely to leave a

job because of child care issues than families of children with ADD or ADHD (Lee, Harrington, Louie & Newschaffer, 2008). Similarly, these parents report more aggravation in parenting than both parents of children with other developmental problems and parents of children with special health needs without developmental problems (aggravation includes feelings about life sacrifices for child, difficulty caring for child, frustration with child's actions, and anger toward child: Schieve, Blumberg, Rice, Visser & Boyle, 2007). These high parenting stress levels can influence both family functioning and intervention effectiveness (Hastings & Symes, 2002; Osborne et al., 2008). Siblings of individuals with PDD also face stressors. Siblings are likely to experience less parental attention, differential positive parental treatment, assumption of parental responsibilities, conflict, and decreased time in out-of-home activities (Schuntermann, 2007). Pervasive developmental disorders have significant implications, not only for the individuals with the disorder, but also for their families.

In addition to parenting concerns, caregivers face report lower marital satisfaction and increased risk of depression than parents of typically-developing children (Brobst, Clopton & Hendrick, 2009; Dunn, Burbine, Bowers & Tantleff-Dunn, 2001; Higgins, Bailey & Pearce, 2005). Parents of a child with autism have nearly twice the divorce rate than parents of typically developing children (Hartley et al., 2010). Additionally, where divorce rates typically taper off with time, divorce rates of parents of a child with autism remain high into the child's adolescence and early adulthood (Hartley et al., 2010). Despite these stressors, some families of children with autism display factors of resilience and report that they “have become stronger as a result of disability in the family” (Bayat, 2007, p. 702).

## **Factors Influencing Treatment**

Though pervasive developmental disorders persist throughout the patient's life, treatment can help improve social and coping skills, as well as couple and family relationships (Bradford, 2010). The course and effectiveness of treatment is affected by several individual factors. These factors include comorbid psychiatric disorders, comorbid medical conditions, and age.

**Co-morbidity.** Often, individuals with pervasive developmental disorders must face not only the symptoms of their PDD but additional symptoms and complications from other comorbid disorders. Individuals with PDD are at an increased risk for comorbid disorders, notably including 1) anxiety disorders, 2) major depressive disorders, and 3) disruptive behavior disorders such as attention deficit hyperactivity disorder (ADHD) and conduct disorder (CD; Leyfer et al., 2006). Additionally, the symptoms of these comorbid disorders may be more severe for individuals with certain pervasive developmental disorders, such as autism spectrum disorders (ASD; Fodstad, Rojahn, & Matson, 2010).

Individuals with pervasive developmental disorders are at a high risk for developing anxiety and depression symptoms. Among children with PDD-NOS, over half meet criteria for an anxiety disorder (Leyfer et al., 2006). Adults with ASD have almost three times the rate of panic attacks, agoraphobia, separation anxiety, and generalized anxiety as adults with other developmental disorders (Gillot & Standen, 2007). Research also indicates a high prevalence of comorbid depression for PDD. In a recent study, 35% of depressed children and adolescents at a psychiatric hospital had a pervasive developmental disorder (Sasayama et al., 2009). Among children with PDD-NOS specifically, 10.6% had major depressive disorder (de Bruin, Ferdinand, Meester, de Nijs, & Verheij, 2007). Similar rates have been reported for children with autism (Leyfer et al., 2006).

ADHD is extremely common in individuals with PDD; among high-functioning children with PDD, 68% meet the criteria for ADHD (Yoshida & Uchiyama, 2004). Despite its high prevalence, the DSM-IV dictates that a diagnosis of ADHD is not made if autistic disorder is present (APA, 2000). However, some research indicates that this separation fails to account for all of the variation in over-activity and inattention within an ASD diagnosis (Yoshida & Uchiyama, 2004).

There are several complications when diagnosing disorders co-morbid with pervasive developmental disorders. These include the client's inability to self-report symptoms and the absence of validated diagnosis instruments. By definition, a client who suffers from a PDD experiences impaired communication processes, and in many cases may have no expressive language. This client impairment may make accurate diagnosis difficult. Additionally, the validity and reliability of several widely used diagnosis instruments for common comorbid disorders have not been tested with individuals with intellectual disabilities or autism spectrum disorders (Deb, Thomas, & Bright, 2001; Matson & Neal, 2009). Research with autism spectrum disorders in particular indicates that ASD may be frequently misdiagnosed, as clinicians tend to focus on the co-morbid disorder (Perry, 2004).

Little research has assessed the effectiveness of treatments for PDD when there are co-morbid conditions (Chalfant, Rapee & Carroll, 2007), but preliminary research indicates that treatment effectiveness may be compromised. A study of a community social skills treatment found that children with only an ASD diagnosis or an ADHD diagnosis both had significant improvements in social skills rating system score over 10 weeks, but children with an ASD diagnosis and a co-morbid ADHD diagnosis did not improve (Antshel et al., 2011).

**Life expectancy and medical conditions.** Though little research has evaluated life expectancy in a number of pervasive developmental disorders, research on autism specifically indicates a reduced life expectancy (Shavelle & Strauss, 1998, Gillberg, 1991). In a study from the California developmental disabilities registry, individuals with autism had a standardized mortality ratio of 2.4, indicating a mortality rate more than double that of the general population (Shavelle & Strass, 2001). In mild cases of autism, death is more than three times as likely to result from seizures, nervous system dysfunction, drowning, or suffocation as in the general population. In more severe cases, all causes of death except cancer were more than three times as likely as in the general population. Additionally, individuals with an autism spectrum disorder are more likely to have concurrent medical conditions than individuals without developmental disabilities, and are significantly more likely to have intestinal illness, food allergy, and frequent diarrhea/colitis than children with other intellectual disabilities or ADHD (Schieve et al., 2011). These concurrent medical conditions may lead to elevated medical costs. For example, a study by Galli-Carminati, Chauvet & Deriaz (2006) found that in a sample of clients hospitalized in a psychiatric unit, 48.8% of clients with pervasive developmental disorders had gastrointestinal disorders, as compared with 8% in all other clients.

**Age.** Though pervasive developmental disorders are life-long, there are transitions in symptom appearance and severity over the life course. Research indicates that some of the core features of autism spectrum disorders in particular tend to decrease with age (Seltzer, Shattuck, Abbeduto & Breenberg, 2004). Developmental trajectories consistently indicate that useful language in early childhood and higher IQ are associated with better ultimate outcomes in all core areas (Baghdadli et al., 2007). Restricted, repetitive behaviors are less frequent and severe among adults (ages 22 and older) than among children (ages 2-13; Esbensen, Seltzer, Lam, &

Bodfish, 2009). Language tends to improve with age, although it generally continues to be impaired. Among children with autism spectrum disorders (n=63), 50% of the sample had improvements in language over ten years (Rutter & Lockyer, 1967). However, even those adolescents who had useful speech continued to have severe impairments (such as echolalia, pronominal reversal, obsessive questioning, etc; Rutter & Lockyer, 1967).

Overall improvement in social reciprocity is much less significant than are improvements in communication and restricted or repetitive behaviors. Deficits in social interactions are likely to remain into adulthood (Seltzer, Shattuck, Abbeduto, & Greenberg, 2004). However, there may still be improvements in certain areas of social interaction. For example, the majority of individuals with autism tend to withdraw physically from others' social initiations in childhood, but do not in adolescence (Rutter & Lockyer, 1967).

Improvements with age are certainly beneficial, but deficits remain for the majority of these individuals. Research indicates that only 10-20% of individuals "who receive a diagnosis of autism in childhood recover fully and achieve levels of functioning typical of their age peers" (Seltzer, Shattuck, Abbeduto, & Greenberg, 2004, p. 239). Asperger's disorder or pervasive developmental disorder- not otherwise specified "may be associated with more favorable adult outcomes than autistic disorder;" however, research in this area has been limited (Seltzer, Shattuck, Abbeduto, & Greenberg, 2004, p. 234). Though deficits are likely to remain significant, education and treatment can solidify or magnify symptom improvement.

Developmental changes are an important focus of current research on autism spectrum disorders, and longitudinal research has recently been used to assess course of symptoms and prognosis (Lord, Luyster, Guthrie & Pickles, 2012). However, the majority of longitudinal research has assessed relatively small sample sizes and has focused on relatively short time

frames; little research has focused on changes from childhood to adolescence and adolescence into adulthood (Anderson et al., 2009; Lord, Luyster, Guthrie & Pickles, 2012; Fountain, Winter & Bearman, 2012). In 2010, a special working group of North American experts on autism concluded "little is known about the phenomenology and associated features of autism spectrum disorders as individuals age... and about specific medical, psychiatric, and social service needs, including the need for long term care" (Piven & Rabins, 2011, p. 2154). Research on autism symptoms and treatment use in adults has been particularly limited. The current study will assess service use across the lifespan. Previous studies have not consistently used any one age categorization to refer to childhood, adolescence, and adulthood (e.g., children 2-13, adolescents 14-21, and adults 22+ in Esbensen, Seltzer, Lam, & Bodfish, 2009; adolescents 12-17 and adults 18+ in Ballaban-Gil, Rapin, Tuchman, & Shinnar, 1996; children under age 16 and adults 21+ in Howlin, Goode, Hutton & Rutter, 2004; adolescents 13+ in Piven, Harper, Palmer & Arndt, 1996). For the purposes of this study, childhood will be defined as under 12, adolescence as 13-17, and adulthood as 18+.

### **Therapeutic Interventions**

Pervasive Developmental Disorders are life-long, but treatments can be effective at improving social skills, coping skills, and family support (Bradford, 2010). Individual, applied behavior analysis treatments are the most common treatment in special education and individual therapy (Harris & Handleman, 2000). However, more recent treatments are beginning to include family training and family approaches (Kaslow, Broth, Smith & Collins, 2012).

Research into these treatments is particularly relevant due to the recent changes in health care through the Affordable Care Act. In the past, many insurance plans have not covered essential health services for individuals with autism, or have not covered these individuals at all

because autism qualifies as a pre-existing condition (AMCHP, 2012). Under the Affordable Care Act, all health plans offered through the exchanges must cover a set of essential benefits, including behavioral health treatment vitally important to children and youth with ASD (AMCHP, 2012).

**Individual interventions.** Little research has assessed individual therapy, independent of therapy model, as a treatment for pervasive developmental disorders (Koenig & Levine, 2011; Stoddart, 1999). This lack of attention may be due to a focus on improving family and community functioning, rather than on improving quality of life and personal satisfaction for the individual (Koenig & Levine, 2011). The majority of research on individual therapy has focused on behavioral interventions, though some limited research has been done on cognitive or insight-oriented interventions (Stoddart, 1999).

Research on individual treatment for pervasive developmental disorders has focused largely on applied behavioral treatment (Kazdin, 1991). This intervention has been linked to significant progress in the social skills of an individual with a pervasive developmental disorder. Applied behavior analysis (ABA) is a behavior therapy developed for treatment of childhood pervasive developmental disorders. Research indicates that children with autism or PDD-NOS who participate in intensive applied behavior analysis interventions make significant progress in intelligence and developmental milestones; these effects have also been shown to last to 3-8 year follow-up (Lovaas, 1987; McEachin, Smith, & Lovaas, 1993; Sallows & Graupner, 2005). Parents tend to report high levels of satisfaction with the program (Smith, Tristram, Buch, & Gamby, 2000). However, the program is time-consuming and expensive, requiring multiple 2-3 hour sessions with trained professionals or attendance in special education settings sometimes up to 60 hours per week (Bradford, 2010).



**Family interventions.** There are many potential definitions of family therapy; it can range from including only traditional family therapy models (e.g., structural, strategic) to more broadly including any family oriented intervention, including behavioral approaches to treating children's behavior problems in the context of the family (Larner, 2004). In this study, family therapy is defined as any psychotherapy that directly involves family members (Pinsof & Wynne, 1995). Interventions are increasingly evaluated in terms of their impact on the whole family (Cebula, 2012; Remington et al., 2007; Schwintenberg & Poehlmann, 2007). A review of twelve studies indicates that family therapy is effective at improving both parenting skills and child behaviors in autism (Estrada & Pinsof, 1995).

Family therapy may be a more effective approach for treatment of individuals with autism spectrum disorders, due to its lasting impact on both children with autism and their families (Pinsof & Wayne, 1995). Parents may even be appropriate ABA administrators after training (Short, 1984). When parents are trained as treatment administrators, they can be available to provide more constant support than another administrator (Powers, 1991). Generalization and maintenance of treatment effects are superior when parents are trained and participate as major providers of treatment, when compared to clinicians (Sattler & Hoge, 2006; Schriebman, 2000; Schriebman, Koegel, Mills & Burke, 1984). Families need to receive training, both to help the identified patient and to help family members cope (Bradford, 2010; Norton & Drew, 1994; Ramisch, 2012; Stiefel, Shields, Swain & Waverney, 2008). Family therapists can help parents scaffold the skills needed for their child's peer and family interactions (Bradford, 2010).

Family training and involvement can also help the family. For example, a warm, positive mother-child relationship can predict fewer strains on the mother (Orsmond, Seltzer, Greenberg,

& Krauss, 2006). Family therapy can lead to increases in parent positive affect and shared parent-child positive affect (Solomon, Ono, Timmer & Goodlin-Jones, 2008). Additionally, family therapy can lead to improved family communication. A randomized control trial between family and individual communication therapy indicated that though both groups improved, the improvement was greater in the family therapy group (Green et al., 2010). Therapy may also help alleviate couple tension. Though there is no research specifically on the efficacy of couple therapy for parents of children with autism (Ramisch, 2010), it is likely that family therapy could help parents access resources, balance the needs of work and family, and cope with their emotional stresses (Solomon & Chung, 2012). Family therapy can help decrease the strain on all family members, in addition to helping the identified patient.

**Special education, speech therapy and occupational therapy.** Though the current study cannot assess special education, speech therapy or occupational therapy, these are key components of treatment for most children with PDD. In the US, a study of the 1997-2005 National Health Interview Survey indicated that only 44.9% of children with autism had seen a medical specialist in the past year and only 54.8% had seen a mental health professional, but 60.5% had seen a speech, occupational, or behavioral therapist and 87% received a special education service or early intervention (Bolet, Boyle & Schieve, 2009). The use of special education interventions (including exclusive special education, mainstreaming where time is split between regular and special education classrooms, and inclusion in regular classrooms with additional services) is a critical treatment component for children and adolescents (Bradford, 2010). Speech and occupational therapy are the most common additional services offered through the school (Bitterman, Daley, Misra, Carlson & Markowitz, 2008).

In addition to being a critical part of services for children and youth with autism, special education, speech therapy and occupational therapy are important to parents. In a survey in the UK, the majority of parents are satisfied with the provisions made for their children at school (Whitaker, 2007). In a US national survey, 87% of parents reported that the quality of services their children received through the school were good or excellent (Bitterman, Daley, Misra, Carlson & Markowitz, 2008).

### **Normative Path of Treatment**

Individuals with pervasive developmental disorders may require multiple courses of treatment. Though some research indicates that half of children can achieve normal levels of functioning with an early intensive intervention and require no further treatment (Lovaas, 1987; Sallows & Graupner, 2005), others have disputed such findings (Marcus, Rubin & Rubin, 2000). If the disorder is chronic and severe, the path of treatment may include multiple episodes of treatment as part of a stable course of illness and symptom maintenance (Crane, Chiang & Fawcett, in review). In the current study, an episode of care is defined as a continuous series of services for one participant. An episode of care ends after a participant has had no psychotherapy claims for 90 days or more. Little research has assessed the number of episodes of treatment in pervasive developmental disorders. There is a need for research that assesses the normative path of treatment for clients with pervasive developmental disorders in mental health treatment.

### **Dropout**

Psychotherapy dropout, also referred to as premature termination or attrition, is a significant obstacle for mental health providers. Across all mental health diagnoses, mean psychotherapy dropout rates range from 17 to 29% (Hamilton et al., 2011). In a ten-year

retrospective study from an Asian continental Indian weekly outpatient clinic of 42 children with PDD, 67% of all patients and their families had dropped out after the first visit (Malhotra, Chakrabarti, Gupta, & Gill, 2004). The drop-out rate for clients with PDD was 2 to 3 times that of other children seen at the clinic (Malhotra et al., 2004). Though there is little research available on drop out among individuals with PDD, it appears that dropout is higher among these individuals.

These high dropout rates have negative consequences for both the client and the therapist or clinic. Clients who drop out have significantly poorer treatment outcomes at four month follow-up than those who complete treatment (Pekarik, 1992; Stark, 1992). Early dropouts lead to higher costs from intake and therapist assignment costs, canceled appointments, and failures to attend sessions (Kazdin, 1996; Weisz, Weiss & Langmeyer, 1987).

Methodologically, there are widely different definitions of dropout, which can lead to very different reported dropout rates (Connell, Grant, & Mullin, 2006). Dropout may be defined by the number of sessions attended, by adherence to therapist judgment, by a combination of these factors, or by failing to return for treatment after intake assessments (Masi et al., 2003). However, not all dropouts can be considered a failure of treatment. Clients may drop out due to changes in life circumstances, including relocation or changes in financial resources (Connell et al., 2006). In cases where the patient is a child with autism, parents may also drop out of treatment when they “disagree with treatment practices or philosophies or find the treatment aversive” (Bowker, D’Angelo, Hicks & Wells, 2010, p. 1378)

Dropout definitions may need to be altered based on treatment setting. If dropout is defined by a cutoff number of sessions, the number is likely to be an arbitrary choice (Reis & Brown, 1999). As managed care requires brief, time-limited therapy, a session cutoff within a

managed care context should likely be smaller than in other contexts (Hamilton et al., 2011). For the purposes of this study, dropout is defined as a participant attending only one session of therapy. This cutoff is selected as it is not likely to overestimate the number of dropouts.

### **Cost and Cost Effectiveness**

**Cost.** Little research exists on the economic costs of the broader category of pervasive developmental disorders, though there is some research on the extensive cost of autism spectrum disorders specifically (Newschaffer & Curran, 2003). A study by Jarbrink and Knapp (2001) indicated that the annual societal cost of autism in the UK exceeds £1 billion (estimated excess of 1.44 billion US dollars), and the lifetime societal cost for each individual with autism exceeds £2.4 million (estimated excess of 3.46 million US dollars). These costs included health services, living support, special education, medication, sheltered work, day care provision, productivity losses, family members' time costs, and family expenses (Jarbrink & Knapp, 2001).

The medical costs for autism spectrum disorders (ASD) are significant. People with an ASD are also more likely to have disabling medical conditions, increasing the need for medical services (Mandell, Cao, Ittenbach, & Pinto-Martin, 2006). Children and adolescents with an ASD have elevated medical costs when compared to children and adolescents without an ASD. In a study of medical expenditures in 2003 from employer-based insurance, medical expenditures for individuals with an ASD were an average of \$4,100 to \$6,200 per year higher than for individuals without an ASD, and were 4.1 to 6.2 times the expenditures of those without an ASD (Shimabukuro, Grosse, & Rice, 2008). Based on Medicaid claims data, mean annual health care expenditures in 2003 for a child with ASD was \$22,772, including: inpatient, outpatient, long-term care (including nontraditional health services such as speech therapy) and

prescription drugs (Wang & Leslie, 2010). Total Medicaid health care expenditures for ASD per 10,000 covered lives rose 32.8% from 2000 to 2003 (Wang & Leslie, 2010).

**Cost effectiveness.** Research on cost effectiveness has focused primarily on individual, early applied behavioral interventions. Research has indicated that these interventions lead to extensive cost savings, whether implemented by trained clinicians, special educators or parents with some training and supervision (Sallows & Graupner, 2005). Jacobson, Mulick, and Green (1998) estimated that an early intensive behavioral intervention (EIBI) would lead to cost savings per child served ranging from \$187,000 to \$203,000 to age 22, and from \$656,000 to \$1,082,000 to age 55. However, this research was criticized for focusing only on EIBI and for assumptions said to be speculative regarding how many children would reach normal functioning (Marcus, Rubin & Rubin, 2000). This study was later replicated by Sallows and Graupner (2005), although other researchers have suggested that their replication is invalid because the intended comparison between randomized groups was not done (Rogers & Vismara, 2008). Chasson, Harris, and Neely (2007) conducted a methodologically similar cost estimation study comparing discrete trial training (a specific form of EIBI) to special education. They estimated that a one-on-one, discrete trial training for 35-40 hours a week in the child's home would lead to a 72% offset in the cost of ongoing special education over the 15 years of school, leading to a total savings of \$208,500 per child across the 18 years of their school experience (Chasson, Harris, & Neely, 2007).

Research on the cost-effectiveness of family interventions outside of parent-administered ABA has been limited. A review of costs and cost-effectiveness of family therapy for pervasive developmental disorders has not yet been done. This is likely due to the scarcity of cost or cost-

effectiveness research for autism (Estrada & Pinsof, 1995). Additional research is needed to explore the costs and cost effectiveness of these interventions.

### **Research Questions**

The current study is an assessment of trends in treatment by treatment providers. Research on the course and costs of treatment have been limited. The majority of research has focused on individual, applied behavioral therapy, but research indicates that family therapy is effective at improving both parenting skills and child behaviors (Kaslow, Broth, Smith & Collins, 2012; Estrada & Pinsof, 1995) and may be a superior approach due to its lasting impact on both individuals with a pervasive developmental disorder and their families.

Despite the increasing prevalence and significant costs of pervasive developmental disorders, very little research has assessed the cost or course of treatment for this population. To date, little research has been done on the normative course of treatment, including dropout rates and number of episodes of care, for pervasive developmental disorders. Research on the cost-effectiveness of family interventions in this population has also been limited. Effective treatments are critical to help minimize these costs and to help provide adequate support to all who are impacted by the disorder.

The research questions for this study were as follows:

1. What are the differences in cost effectiveness, treatment length, dropout, and number of episodes of care between individual, family, and mixed (including both individual and family) therapy modalities for PDD treatment? Given the recent evidence for improved intervention effectiveness when the family is trained in treatment, there may be differences between relational and non-relational based treatments. It is hypothesized that family and mixed therapy may have

better cost effectiveness, shorter treatment length, lower dropout rates and fewer episodes of treatment.

2. What are the differences in cost effectiveness, treatment length, dropout, and number of episodes of care between treatment providers with different professional license types or different degrees? This question aims to identify whether or not there are advantages to a specific type of training in treating pervasive developmental disorders. If differences exist between license types, future research could identify what aspects or levels of training are or are not helpful in PDD treatments.

3. What are the differences in treatment length, dropout, and number of episodes of care by age? Research suggests that the core symptoms of pervasive developmental disorders tend to decrease from childhood to adolescence as well as from adolescence to adulthood (Seltzer, Shattuck, Abbeduto, & Breenberg, 2004). Ages of participants in this study range from 1 to 61. It is likely that older individuals with PDD require less intensive treatments.

4. What are the differences in treatment length, dropout, and number of episodes of care by diagnosis? Preliminary research indicates that Asperger's disorder or pervasive developmental disorder- not otherwise specified may have better outcomes than autistic disorder (Seltzer et al., 2004). It is hypothesized that the PDD-NOS diagnosis will require less intensive treatments.

5. What are the differences in treatment length, dropout, and number of episodes of care by comorbid disorder? Preliminary research indicates that a comorbid disorder can complicate diagnosis and treatment. It is hypothesized that individuals with a secondary diagnosis of one of the commonly comorbid disorders will require more intensive treatments.



## 6. What are the differences in number of episodes of care by intensity of treatment?

Intensive treatments, such as applied behavioral analysis, are intended to lead to significant and long-lasting progress. Research indicates that there is an increase in skill acquisition with increased treatment hours during early intensive behavioral intervention (Granpreesh, Dixon, Tarbox, Kaplan & Wilke, 2009). It is hypothesized that intensive treatments (measured by number of sessions per week) will be associated with fewer episodes of care.

### **Method**

#### **Design**

The current study is a retrospective study using administrative data from Cigna, a leading health care insurance provider in the United States. The use of administrative data for retrospective statistical analysis is allowed by the Health Insurance Portability and Accountability Act of 1996 (HIPAA). No unique subscriber or provider information is available in the data. The data set used in the current study is a subset drawn from a larger data set. For a full explanation of the original data set and data cleaning procedure, see Crane and Payne (2011).

#### **Sample**

Participants ( $n = 2,095$ ) included individuals who had been diagnosed with a pervasive developmental disorder, including autistic disorder (DSM IV 299.0) and pervasive developmental disorder – not otherwise specified (DSM IV 299.80), and who received reimbursement for individual and/or family therapy from Cigna during 2001-2006. Participants were seen in outpatient clinics. Participants' ages range from 1 to 61 ( $M = 11.05$ ,  $SD = 7.452$ ). Sixty-seven percent of participants were children (ages 1 to 12), 22% were adolescents (ages 13 to 17), and 11% were adults (18 or older). 17.9 percent ( $n=376$ ) of participants were female, 81.7% ( $n=1,712$ ) of participants were male, and gender was not reported for 7 participants. 17.9

percent (n=375) of participants were diagnosed with autistic disorder and 79.1% (n=1657) were diagnosed with pervasive developmental disorder – not otherwise specified. Participants with the following diagnoses were excluded from diagnosis analysis due to small sample size: 299.01 (autistic disorder residual state, n = 3), 299.1 (childhood disintegrative disorder; n = 12), 299.81 (other specified pervasive developmental disorders, residual state, n =14), 299.90 (unspecified pervasive developmental disorder; n = 28), and 299.91 (unspecified pervasive developmental disorder, residual state; n = 2). Participants represented all regions of the United States except Hawaii. No additional demographic data were available for consideration.

### **Providers**

This study includes the following five providers: Medical Doctors, Marriage and Family Therapists (MFTs), Professional Counselors, Social Workers (MSWs), and Psychologists. These providers were studied because they are nationally recognized as independently licensed health care practitioners (Crane & Payne, 2011). When a provider had multiple licenses, provider type was determined by the first license identified as “primary.” Unlike other studies, nurses were not included in the present analyses since they provided care in only four cases.

### **Definition of Terms**

**Episode of care.** Cigna defines an episode of care (EoC) as a continuous series of services for one participant. An episode of care ends after a participant has had no psychotherapy claims for 90 days or more. The number of sessions in the first episode of care ranged from 1 to 203 (M = 9.20, SD = 13.76).

**Re-admission.** For the purposes of this study, a readmission is defined as a patient returning to therapy (after at least 90 days break) for an additional episode of care with the same provider type (Crane & Payne, 2011; Fawcett & Crane, in press).

**Total cost.** Total cost is defined as the total dollar amount paid by Cigna for all therapy services during the episode of care.

**Cost effectiveness.** The formula for cost-effectiveness is: Estimated cost effectiveness = 1st EoC average cost + (1st EoC average cost \* readmission rate) (Crane, 2008; Crane & Payne, 2011; Moore et al, 2011). This formula was developed to compare different types of therapy treatments and professions based on treatment cost and readmission rate. Participants who dropped out of treatment were eliminated from cost-effectiveness analysis to prevent artificially low costs and readmission rate.

**Drop out.** Drop out is defined as a participant attending only one session of therapy (Johansson & Eklund, 2006).

**Family therapy.** Family therapy is identified in this study by Current Procedural Terminology (CPT) code 90847, “Family psychotherapy (conjoint psychotherapy) (with patient present)” (American Medical Association, 2006, p. 278).

**Individual therapy.** Individual therapy in this study is identified by CPT code 90806, “an insight oriented, behavior modifying, and/or supportive treatment in an office or outpatient facility, approximately 25 to 50 minutes face-to-face with the patient” (American Medical Association, 2006, p. 277).

**Mixed therapy.** Mixed therapy in this study is defined as an episode of care including sessions of both family therapy and individual therapy. This definition does not address the range of possible individual to family therapy ratios. For example, an episode of care would be classified as “mixed” if it consisted of 20 individual sessions and one family therapy session, or if it consisted of 20 family therapy sessions and one individual session. Though not an ideal definition, this modality is included to represent those treatments that are not exclusively family

therapy or exclusively individual therapy. Participants who were referred to a provider of another license type are excluded from this analysis; consequently, this definition of mixed therapy reflects that the same provider conceptualized treatment both relationally and individually at some point during treatment.

## Results

Research Question 1. The first question assessed the differences in treatment outcomes between individual, family therapy, and mixed modalities for PDD treatment. A one-way, between subjects ANOVA was run to determine differences in the dependent variables of treatment length and number of episodes of care, with therapy modality as a three-group, nominal independent variable.

Analysis of log transformed treatment length by modality revealed a significant difference between all three modalities,  $F(2, 1650) = 52.11, p < .001$ . Treatment length was log transformed to adjust for positive skew in the data. Tukey post-hoc comparisons of the three groups indicate that family therapy ( $M = 0.71, SD = 0.36$ ) had significantly fewer log transformed sessions than did individual therapy ( $M = 0.81, SD = 0.40$ ), which in turn had significantly fewer log transformed sessions than did mixed therapy ( $M = 0.98, SD = 0.40$ ). In order to describe these trends in real units, these descriptive statistics were back-transformed. Family therapy had an average number of sessions of 5.13 ( $SD=1.82$ ), individual therapy had an average number of sessions of 6.46 ( $SD=2.51$ ), and mixed therapy had an average number of sessions of 9.55 ( $SD=2.51$ ). Dropouts were excluded from all treatment length analyses, to prevent artificially lowered treatment lengths.

Analysis of number of episodes of care by modality revealed a significant difference,  $F(2, 2086) = 41.75, p < .001$ . Note that the number of participants across analyses is slightly

different due to missing data in certain variables. Tukey post-hoc comparisons of the three groups indicate that family therapy ( $M = 1.15$ ,  $SD = .47$ ) had significantly fewer episodes of care than did individual therapy ( $M = 1.24$ ,  $SD = .63$ ) or mixed therapy ( $M = 1.50$ ,  $SD = .80$ ).

In order to determine if the cost differences between the treatment modalities were significant, ordinary least squares regression was run, with total dollars as the dependent variable and treatment modalities as independent variables. Analysis of real dollars showed  $r(1652) = .05$ ,  $p < .05$ . The resulting regression model was: Total dollars =  $763.01 - (140.55 * \text{Modality})$ , indicating that total dollar amount is expected to decrease by \$140.55 when using family therapy rather than individual therapy.

Cost effectiveness was assessed through the cost effectiveness formula: 1st EoC average cost + (1st EoC average cost \* readmission rate). Results for both total log dollars and log cost effectiveness as well as cost effectiveness in back-transformed real dollars are shown below. Total dollars were log transformed to adjust for positive skew in the data, but descriptive statistics were back-transformed in order to describe these trends in real units.

Insert Table 1 about here

Insert Table 2 about here

Chi square was used to determine the difference between the two-level dependent variable of dropout rates and the three-level independent variable of therapy modality. A power analysis using G\*Power 3.1.2 (Faul, Erdfelder, Lang & Buchner, 2007) revealed that the sample was sufficiently large to find a small effect size for both a chi square analysis and analysis of variance. There was no significant difference in dropout rates between modalities,  $\chi^2(3, N = 1653) = 2.29$ ,  $p = .13$ .

Research Question 2. This research question assessed the differences in treatment outcomes by provider license types. A one-way, between subjects ANOVA was run to determine differences in the dependent variables of treatment length and number of episodes of care, with provider license type or degree as a five-group, nominal independent variable.

Analysis of treatment length by provider license revealed no significant differences  $F(4, 1406) = 1.52, p = .19$  in treatment lengths. Also, analysis of number of episodes of care by provider license revealed no significant differences,  $F(4, 1793) = 0.63, p = .64$ .

Cost effectiveness was assessed through the cost effectiveness formula: 1st EoC average cost + (1st EoC average cost \* readmission rate). Results for both total log dollars and log cost effectiveness as well as cost effectiveness in back-transformed real dollars are shown below. Total dollars were log transformed to adjust for positive skew in the data, but descriptive statistics were back-transformed in order to describe trends in real units.

Insert Table 3 about here

Insert Table 4 about here

Chi square was used to determine the difference between the two-level dependent variable of dropout rates and the five-level independent variable of professional license type. Analysis revealed a significant difference in dropout rates between license types,  $\chi^2(5, N = 1411) = 63.67, p < .001$ . Dropout rates were 11.9% for MFTs, 13.6% for MSWs, 15.1% for counselors, 24.9% for Psychologists, and 45.7% for MDs.

Research Question 3. This research question assessed the differences in treatment outcome by age. A one-way, between subjects ANOVA was conducted to determine differences in the dependent variables of treatment length and number of episodes of care by the 3-group

independent variable of age group (adults ages 18 and older, adolescents ages 13-17, and children ages 2-12).

Analysis of treatment length by age group revealed no significant difference in total number of sessions by age,  $F(2, 1650) = 0.61, p = .54$ . Analysis of number of episodes of care by age group revealed no significant difference,  $F(2, 2086) = 1.55, p = .21$ .

Chi square was used to determine the difference between the two-level dependent variable of dropout by the three-level independent variable of age group. Analysis revealed a significant difference in dropout rates by age group,  $\chi^2(2, N = 1652) = 14.77, p < .001$ . Dropout rates were 14.9% for teenagers, 18.7% for adults, and 23.1% for children.

Research Question 4. This question assessed the differences in treatment outcomes by diagnosis. T-tests were conducted to determine differences in treatment length and number of episodes of care between the two diagnoses (autism and PDD-NOS). Treatment length and number of episodes of care were log transformed to adjust for positive skew in the data. In the analysis of log-transformed treatment length and diagnosis, the difference was significant  $t(1613) = 84.77, p < .001$ . Autism had a mean log number of sessions of 0.83 ( $SD = 0.41$ ) and PDD-NOS had a mean of 0.86 ( $SD = 0.40$ ). In order to describe these trends in real units, these descriptive statistics were back-transformed. Autism had a mean number of sessions of 6.76 ( $SD=2.57$ ), and PDD-NOS had a mean of 7.24 ( $SD=2.51$ ). In the analysis of log number of episodes of care and diagnosis, the difference was significant,  $t(2031) = 21.60, p < .001$ . Autism had a mean log number of episodes of care of 0.85 ( $SD = .17$ ), and PDD-NOS had a mean of 0.73 ( $SD = .15$ ). In order to describe these trends in real units, these descriptive statistics were back-transformed. Autism had a mean number of episodes of care of 7.08 ( $SD=1.48$ ), and PDD-NOS had a mean of 5.37 ( $SD=1.41$ ).

Chi square was used to determine the difference between the two-level dependent variable of dropout rates by diagnosis. Analysis revealed no significant differences in dropout rates by diagnosis,  $\chi^2(2, N = 2032) = 1.95, p = .16$ .

Research Question 5. This question assessed the differences in treatment outcomes by comorbid disorder, including 1) anxiety disorders, 2) major depressive disorders, and 3) disruptive behavior disorders including attention deficit hyperactivity disorder (ADHD) and conduct disorder (CD; Leyfer et al., 2006). A t-test was conducted to determine differences in the dependent variables of treatment length and number of episodes of care and the two-group independent variable of comorbid disorder (1= has one of the three comorbid disorders, 0 = does not have one of the three comorbid disorders). A dummy variable was created rather than assess comorbid diagnoses individually because preliminary analyses indicated there was no difference in treatment outcomes between specific comorbid conditions.

Treatment length was log transformed to adjust for positive skew in the data. In the analysis of log transformed treatment length and comorbid diagnosis, the difference was significant  $t(1652) = 85.82, p < .001$ . Individuals without a comorbid diagnosis had a mean log number of sessions of 0.67 ( $SD = 0.49$ ), and individuals with a comorbid diagnosis had a log mean of 0.73 ( $SD = 0.52$ ). In order to describe these trends in real units, these descriptive statistics were back-transformed. Individuals without a comorbid diagnosis had a mean real number of sessions of 4.68 ( $SD=3.10$ ), and individuals with a comorbid diagnosis had a mean of 5.37 ( $SD=3.31$ ). In the analysis of number of episodes of care and morbid diagnosis, the difference was significant,  $t(2084) = 88.85, p < .001$ . Individuals without a comorbid diagnosis had a mean number of episodes of care of 1.29 ( $SD = .67$ ), and individuals with a comorbid diagnosis had a mean of 1.24 ( $SD = .58$ ).



Chi square was used to determine the difference between the two-level dependent variable of dropout rates by the three-level independent variable of comorbid diagnosis. Analysis revealed no significant difference in dropout rates by comorbid disorder,  $\chi^2(3, N = 2089) = 0.38, p = .54$ . This finding indicates that having a comorbid disorder does not increase chance of dropout.

Research Question 6. This research question assessed the differences in number of episodes of care by intensity of treatment. Multiple linear regression analysis was used to examine the relationship between the number of episodes of care and potential predictors, including intensity of treatment (measured by number of sessions per week), age, gender, diagnosis, provider type, and modality. Basic descriptive statistics and regression coefficients are shown below. Intensity, MSW license, individual modality, and family therapy modality were significant predictors of number of episodes of care ( $p < .05$ ). This indicates that a higher intensity treatment, using an MSW provider, and using individual or family therapy (as opposed to mixed therapy) were all associated with fewer episodes of care. The model was able to account for 6% of the variance in number of episodes of care,  $F(10, 678) = 4.36, p < .001$ . While a statistically significant result, this model shows very little prediction power. Intensity was negatively related to number of episodes of care ( $B = -0.14, t = -3.71, p < .001$ ), as was MSW license ( $B = -0.08, t = -1.97, p = .05$ ), individual modality ( $B = -.11, t = -2.40, p < .05$ ) and family therapy ( $B = -0.22, t = -4.84, p < .001$ ).

Insert Table 5 about here

### **Discussion**

The first research question assessed the differences in the treatment length, number of episodes of care, dropout, and cost effectiveness by therapy modality. Differences in treatment

length between modality were all significant. Family therapy had significantly fewer sessions than individual therapy, which in turn had fewer sessions than did mixed therapy. Differences in number of episodes of care between therapy modalities were all significant, with family therapy having the fewest episodes of care, followed by individual therapy, and then mixed therapy. There were no significant differences in dropout by modality. In terms of cost effectiveness, family therapy was the most effective modality, with an average real cost effectiveness of \$329.88, followed by individual therapy at \$473.18, and then mixed therapy at \$803.40.

Family therapy may be more cost-effective than individual therapy because families learn how to help the individual manage the symptoms of their pervasive developmental disorder (Sattler & Hoge, 2006), so the individual can continue functioning effectively with fewer episodes of care. However, this possibility would need to be confirmed in future research, as data on symptoms were not available for this study. Mixed therapy had significantly more sessions, more episodes of care, and less cost-effectiveness than either individual or family therapy. The cause of these differences is unknown. Cases that required mixed therapy may have been more severe, and therefore may have required more treatment sessions and episodes.

The second research question assessed differences in treatment length, number of episodes of care, dropout, and cost-effectiveness by license type. There were no significant differences in treatment length or number of episodes of care by provider license. There was a significant difference in dropout rates, with dropout rates of 11.9% for MFTs, 13.6% for MSWs, 15.1% for counselors, 24.9% for Psychologists, and 45.7% for MDs. In cost effectiveness, MDs were the least costly, followed by psychologists, then counselors, then MFTs. MSWs were the most costly. This is due largely to the MSW's high readmission rate. As social workers are specially trained in case management, they may be likely to refer the family to community and

other outside resources, and then have the family return to treatment at a later time. MDs may be the most likely to combine pharmacology with counseling, and thus may facilitate client stability at a faster rate. MFT was the second most costly of all license types. Though family therapy was the least costly mode of therapy, these results indicate that MFTs, as a profession, are more costly in their delivery of care. The low dropout rate for MFTs may indicate that MFTs are more likely to retain clients for an adequate “dose” of treatment, and the higher cost may be justified in the long run. However, further research would be needed to investigate this possibility.

The third research question assessed differences in treatment length, number of episodes of care, and dropout by age group (adults ages 18 and older, adolescents ages 13-17, and children ages 2-12). There were no significant differences in treatment length (as measured by number of sessions) or number of episodes of care by age. Differences in dropout rate were significant by age group, with rates of 14.9% for teenagers, 18.7% for adults, and 23.1% for children. This indicates that children are much more likely than teenagers or adults to withdraw from treatment. In cross-diagnosis research on premature termination, adult premature termination was associated with individual characteristics, but no variable predicted children's termination (Pekarik, 1991). Further research is needed to assess reasons for this distinction (Malhotra, 2004).

The fourth research question assessed differences in treatment length, number of episodes of care, and dropout rates by diagnosis (PDD-NOS and autism). There were no significant differences in dropout by diagnosis. On average, individuals with autism had fewer sessions but more episodes of care than did individuals with PDD-NOS. Though research has generally indicated that there is no clear distinction between pervasive developmental disorder subtypes (APA, 2011; Kurita, 2011), some research has indicated limited increased symptomology in

PDD-NOS (Pearson et al., 2006; Snow & Lecavalier, 2011; Wesibrot et al., 2005). It may be that individuals are diagnosed with PDD-NOS when they have some increased symptomology, and that these individuals require longer stays of treatment, but their symptoms are then resolved in fewer episodes of care. Additional research is needed on the reasons for this distinction.

The fifth research question assessed differences in treatment length, number of episodes of care, and dropout rate by existence of one of the common co-morbid disorders, including anxiety disorders, major depressive disorders, and disruptive behavior disorders. There were no significant differences in dropout rates. Individuals with a co-morbid disorder had significantly longer treatment length, but had significantly fewer episodes of care. It may be that these clients' treatment is more intensive initially, but concerns are resolved during the initial episodes of care.

The sixth research question assessed predictors of number of episodes of care. Results indicated that intensity of treatment, MSW license, individual modality, and family therapy modality were significant predictors of number of episodes of care, accounting for 6% of the variance. The fact that these factors account for only a small percentage of the variance indicates that extra-therapeutic factors play a large role in the treatment and symptom maintenance of pervasive developmental disorders. However, use of intensive family therapy may be associated with a need for fewer episodes of care. It may also be important to identify what aspects of MSW training lead to additional episodes of care, and whether or not this is necessary for the client.

### **Clinical Implications**

The results of this study provide important evidence that family therapy is a cost-effective treatment option for pervasive developmental disorders. Family therapy had fewer sessions, fewer episodes of care, and better cost-effectiveness than either individual or mixed

therapy. Clinicians in settings requiring time-limited treatment should consider including family members in PDD treatment. Additionally, family therapy has the lowest readmission rate, which could indicate that family therapy decreases need for an additional course of treatment. Finally, as clinicians initiate services with individuals with PDD, they must be mindful that children with PDD have high dropout rates. It is therefore particularly important that clinicians communicate and address potential barriers to ongoing treatment with family members.

### **Limitations**

Although the current study suggests that family therapy is a more cost effective treatment for pervasive developmental disorders, these findings should be interpreted with caution. There are several limitations of this study, including limited selection of license types, lack of symptom information, and lack of information about treatment termination.

One major limitation is that the only providers studied were mental health professionals. There are a number of other professional groups who are important in the treatment of pervasive developmental disorders, including special education professionals, speech language pathologists, and occupational therapists. The absence of data from these professionals in the current data set leaves out a vital part of effective treatment. This study likely underestimates the cost of care for pervasive developmental disorders, as it does not include these service providers.

Additionally, no information is available on symptom severity or alleviation. This information could have significant implications for this study's findings. For example, mixed therapy was found to be the most costly method of therapy. However, as there was no information about symptom severity, it is unknown whether these clients had more severe symptoms and therefore required more intensive treatments.

Similarly, no information was available on reason for termination, which could have significant implications for this study. In this study, all analyses were drawn from information in Cigna utilization data, and it was not possible to examine symptom alleviation outcomes of therapy. This study assumes that shorter length of treatment and fewer episodes of care reflect symptom alleviation. However, it is also possible that the participant found treatment ineffective and ended treatment or changed treatment type.

We define dropout as terminating after one session in order to have a highly sensitive definition. However, clients who dropped out of treatment after more than one session, despite ongoing significant symptoms, are not captured in our definition of dropout. This study found no differences in dropout by therapy modality for individuals with pervasive developmental disorders, but information about symptoms could have led to a more specific definition of dropout. A broader study (Moore, Hamilton, Crane, & Fawcett, 2011) found higher dropout rates for those attending family therapy, suggesting that individuals in family therapy may be more likely to terminate treatment prematurely. It is possible that individuals in family therapy terminated early, leading to lower cost, but this might lead to later costs in increased medical expenses, lowered productivity, or increased absenteeism.

### **Directions for Future Research**

More research is needed to answer questions about the conditions under which therapy is most cost-effective for pervasive developmental disorders. Within the limitations of the data set, there was no information about symptom severity or alleviation over the course of treatment. Future studies should assess not only the costs associated with the delivery of therapy, but also the benefits associated with decreased symptoms and/or improved quality of life. A complete cost-benefit analysis would identify a more complete picture of the impact of treatment.

Additionally, further research is also needed to assess reasons for children's high drop out rates from treatment. Further research is needed to assess the purpose for any differences in treatment length by diagnosis.

### **Conclusion**

This study demonstrates that family therapy (as a modality) is cost-effective for individuals with pervasive developmental disorders. As this study is based on cost data from a national insurance company, this study provides important information for health maintenance organizations as they make decisions about mental health providers.

Although the findings of this study are limited to cost effectiveness, dropout, and readmission, other research supports the suggestion that individuals with pervasive developmental disorders could benefit from family therapy (Sattler & Hoge, 2006; Schreibman, 2000; Schriebman, Koegel, Mills & Burke, 1984). Family involvement gives both the client and their family an opportunity to learn to cope with the disorder, and also allows family members to be involved as ongoing treatment providers, facilitating progress maintenance (Sattler & Hoge, 2006). This study supports the argument for the provision of family therapy for pervasive developmental disorders by indicating that family therapy is a cost-effective option, providing long-term benefits to both clients and their families.

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Table 1  
Log Dollar and Log Cost Effectiveness

	N	Mean Log \$	SD Log\$	Readmission	Log Cost Effectiveness
Individual Therapy	854	2.53	.44	24.89%	3.16
Family Therapy	273	2.46	.40	14.38%	2.81
Mixed Therapy	526	2.71	.44	56.65%	4.25

Table 2  
Real Dollar, Readmission Rates and Cost Effectiveness

	N	Mean Real \$	SD\$	Readmission	Real Cost Effectiveness
Individual Therapy	854	338.84	2.75	24.89%	473.18
Family Therapy	273	288.40	2.51	14.38%	329.88
Mixed Therapy	526	512.86	2.75	56.65%	803.40

Table 3  
Log Dollar, Readmission Rates and Log Cost Effectiveness

	N	Mean Log \$	SD Log\$	Readmission	Log Cost Effectiveness
MD	50	2.57	.42	22.83%	3.16
Psychologist	740	2.57	.42	27.61%	3.28
Counselor	203	2.53	.41	30.54%	3.30
MFT	74	2.60	.45	29.76%	3.37
MSW	344	2.51	.44	36.18%	3.42

Table 4  
Real Dollar, Readmission Rates and Cost Effectiveness

	N	Mean Real \$	SD \$	Readmission	Real Cost Effectiveness
Counselor	203	371.54	2.63	30.54%	485.00
Psychologist	740	371.54	2.63	27.61%	474.12
MSW	344	338.84	2.57	36.18%	461.44
MD	50	398.11	2.82	22.83%	489.00
MFT	74	323.59	2.75	29.76%	419.90

Table 5  
Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	6.79	17.26		0.39	0.69
Intensity of Treatment	-0.04	0.01	-0.14	-3.71	0.00
Age	0.00	0.00	-0.02	-0.40	0.69
Gender	-0.02	0.05	-0.01	-0.38	0.71
Diagnosis	-0.02	0.06	-0.01	-0.31	0.75
Counselor	-0.09	0.06	-0.06	-1.62	0.11
MD	0.16	0.10	0.06	1.63	0.10
MSW	-0.09	0.04	-0.08	-1.97	0.05
MFT	-0.02	0.08	-0.01	-0.29	0.77
Individual Modality	-0.10	0.04	-0.11	-2.40	0.02
Family modality	-0.25	0.05	-0.22	-4.84	0.00

Dependent: Number of Episodes of Care