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# Integrated Health Care Collaboration and Pediatric Autoimmune Neuropsychiatric Disorder Associated with Streptococcal Infections: A Working Model for Case Consultation

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Philadelphia College of Osteopathic Medicine  
Department of School Psychology

INTEGRATED HEALTH CARE COLLABORATION AND PEDIATRIC  
AUTOIMMUNE NEUROPSYCHIATRIC DISORDER ASSOCIATED WITH  
STREPTOCOCCAL INFECTIONS: A WORKING MODEL FOR CASE  
CONSULTATION

Tara M. Habecker-Tumilty

Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of  
Psychology

October 2013

PHILADELPHIA COLLEGE OF OSTEOPATHIC MEDICINE  
DEPARTMENT OF PSYCHOLOGY

**Dissertation Approval**

This is to certify that the thesis presented to us by Tara Tumilty  
on the 18<sup>th</sup> day of June, 2013, in partial fulfillment of the  
requirements for the degree of Doctor of Psychology, has been examined and is  
acceptable in both scholarship and literary quality.

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*“Keep your dreams alive. Understand to achieve anything requires faith and belief in yourself, vision, hard work, determination, and dedication. Remember all things are possible for those who believe.”*

--- Gail Devers (American athlete)

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*Faith makes all things possible... love makes all things easy.*

-Dwight L. Moody

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## Abstract

Historically, integrated health care, often referred to as interdisciplinary health care, has been an approach characterized by a high degree of collaboration and communication among health care professionals. While numerous researchers have explored the benefits of including clinical psychologists as team members, a limited body of research has explored the partnership between school psychologists and physicians, even though school health services can be an effective venue for integrating psychosocial care and education with medical care. As more chronically ill children are reintegrated into school, school psychologists must be prepared to work with these children at school. Children diagnosed with complex medical disorders, such as Pediatric Autoimmune Neuropsychiatric Disorder Associated with Streptococcal Infections (PANDAS), require strong intersystemic relationships from various disciplines to assist in diagnosing, assessing, and treating the disorder; however, barriers to effective interdisciplinary healthcare collaboration can be numerous. The primary purpose of this study was to survey medical students at Philadelphia College of Osteopathic Medicine (PCOM) in order to explore PCOM medical students' awareness of PANDAS, to explore their self-reported level of agreement in the value of providing integrated health care collaboration to school psychologists on associated medical and psychological impairments, and to determine important considerations for the pediatric school psychologist to consider in order to maximize opportunity for successful integrated health care collaboration. The results indicated that only a small percentage of PCOM medical students were aware of PANDAS and that the efforts to promote interdisciplinary health care collaboration on the campuses of PCOM have been inconsistent. The data from the survey were then used

to construct a working model of specific considerations for both the school psychologist and the physician to consider when working with children with PANDAS/PANS.

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*"The purpose in life is to collaborate for a common cause; the problem is nobody seems to know what it is." - Gerhard Gschwandtner*

## Chapter One

### Introduction

“He seemed to change overnight...”

Imagine the following scenario: Seemingly overnight, a happy, healthy, typically developing child abruptly changes into someone unrecognizable to even his own parents. The once calm-tempered child is now a child who is consumed with his ritualistic hand washing in fear of germs or chemicals; riddled with worry about choking on food; avoidant of personal hygiene routines, such as brushing teeth, bathing, or changing clothes; and echoing sounds that others make, such as a cough or sneeze. This child has now regressed to the point of exhibiting intense and unspecified separation anxiety, enuresis, facial grimaces, choreiform movements, and vocal tics without a past history of such. This child was once a gifted artist. Now he draws pictures that resemble the first time a toddler picked up a crayon and put it to paper. His parents’ frustration is unremitting when they are told repeatedly by highly trained medical specialists that there does not seem to be a known etiology for the abrupt onset of behaviors, and school staff remains perplexed about supporting such complex behavioral needs at school. Parents exhaust their financial resources, time, and energy to find answers. When his parents finally find a professional who can tell them what is wrong with their son, they are relieved to have an explanation, yet perplexed at the news. Specifically, they receive the explanation that their child’s immune system is responsible for these behaviors and further learn that their child has an autoimmune disorder.

The immune system, which is comprised of molecules, cells, and organs, has several primary functions. One of its chief roles is to guard against infection. Another key responsibility is to recognize a pathologic agent and destroy it while preserving healthy tissue, a process known as self-tolerance. When the body's ability to enforce self-tolerance is compromised, an autoimmune response may occur, allowing the immune system to produce autoantibodies (Swedo & Grant, 2005) that mistakenly begin attacking healthy cells and tissues.

According to the American Autoimmune Related Diseases Association, Inc. (2011), between 80 and 120 recognized autoimmune diseases are documented. The exact etiology of autoimmune disorders is still being investigated, and often an exact diagnosis is difficult to determine, given the complexity of symptomatology and the compatibility of the symptoms to other types of illnesses. A particular obstacle to confirming a definitive diagnosis of brain-based autoimmune origin is that many of the symptoms follow a waxing and waning period, which gives false hope that the disease has been cured during periods of symptom dormancy.

School-age children are susceptible to contracting common communicable viral and bacteria-related illnesses as a result of their close proximity to other children. The immune systems of most children combat the infection with few, if any, residual effects. In a small subset of the child and adolescent population, the immune system works against them by mistakenly attacking select cortical and subcortical structures in the brain, causing some form of acute-onset neuropsychiatric impairment. In this subgroup of children, the rapid onset of a variety of uncontrollable neuropsychiatric symptoms and health-related illnesses significantly affects their functioning and quality of life across

home, school, and community environments; therefore, collaborative efforts across all child-serving systems are essential to ensure appropriate diagnosis, intervention planning, monitoring, and generally positive treatment outcomes.

Pediatric school psychologists focus on the promotion of children's health and development through the coordination of efforts across systems, including family, school, health system, and community agencies (Power & Bradley-Klug, 2013). Because they work collaboratively across systems and disciplines, they understand factors that influence effective communication among correspondents from varying specializations, as suggested by Power & Bradley-Klug (2013):

Pediatric school psychologists understand that promoting student success in school depends upon a wide range of variables, including school factors (e.g. content and method of instruction, teacher-student relationships, peer relationships), family factors (e.g. quality of the parent-child relationship, parental regulation of child behavior, family involvement in education), health system factors (e.g. access to health systems, trust in health provider, quality of care), and the connections among these systems. (p. 3)

### **Statement of the Problem**

A growing literature base supports that infection with streptococcus in children results in such neuropsychological sequelae as motor and vocal tics and symptoms consistent with obsessive-compulsive disorder (OCD) that impact functioning in the school setting (Gabbay & Coffey, 2003; Mink & Kurlan, 2011). Children diagnosed with complex medical disorders, such as pediatric autoimmune neuropsychiatric disorders associated with streptococcal infections (PANDAS), require strong intersystemic

relationships from various disciplines to assist in diagnosing, assessing, and treating the disorder. With the increasing passage of federal statutes (see Preventive Health Amendments of 1992 [PL 102-531]; The Alcohol, Drug Abuse, and Mental Health Administration Reorganization Act of 1992 [PL 102-321]; and the Education of the Handicapped Act Amendments of 1990 [PL 101-476], now titled Individuals with Disabilities Education Act [IDEA], the role of the school psychologist is evolving to meet the increasing mandates for services for children with health-related needs who attend school.

According to the American Psychological Association, “Integrated health care, often referred to as interdisciplinary health care, is an approach characterized by a high degree of collaboration and communication among health professionals” (2008, p.1). School health services can be an effective venue for integrating psychosocial care and education with medical care (Brown, 2004). As more chronically ill children are reintegrated into school, school psychologists must be prepared to work with these children at school. In 2001, The American Academy of Pediatrics’ Committee on School Health offered recommendations on the potential for expanded school health services to address the full range of medical and psychological needs of children, making clear that many professional disciplines must work together to achieve this outcome and bring their respective areas of expertise to school (Brown, 2004).

While interdisciplinary care has many benefits, barriers exist among professional disciplines that make successful treatment collaboration difficult to achieve. Most of the existing research in the general field of psychology has focused on the relationship between physicians and clinical psychologists working outside the school setting. For

example, studies have found that effective communication parameters with physicians include the protection of confidentiality, awareness of different physician styles and needs, avoidance of jargon, brief and concise communication, scheduled regular times to meet, and ongoing physician communication (Belar & Deardorff, 1995; Gatchel & Oordt, 2003). Additional research has identified the necessary skills for participants to possess in order to optimize efforts for successful collaboration. These skills include focused assessments; time and session efficiency; decisive decision making with diverse and limited data; flexibility; enhanced patient motivation for change; understanding of medical conditions; procedures, and medications, and attainment of advanced board certifications (e.g., American Board of Professional Psychology; Gatchel & Oordt, 2003; Haley et al., 2004); however, effective communication styles and necessary skills for effective collaboration between pediatricians and school psychologists have yet to be developed fully.

**Purpose of the Study:**

Pediatric school psychology, an extension of the integrated healthcare model, is a relatively new subspecialty within the general field of psychology. The traditional role of the school psychologist is evolving, with more support for school psychologists to be trained in pediatric psychology to fill the role of mental health specialist and facilitator of pediatric care (Power et al., 1999; Kubiszyn, 1994; Power et al., 1995; Power & Bradley-Klug, 2013). Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal infections (PANDAS) is an example of a condition that would require the close collaboration among professionals across domains of functioning. Physicians trained in Osteopathic Medicine (DO) are trained to be collaborative with other



disciplines because of their focus on treating the “whole person” rather than just the symptoms of the disease, their abandonment of the Cartesian view of the mind and body as separate entities, and their focus on prevention. A literature search failed to produce documentation that discusses what the collaborative role between school psychologists and physicians would look like if they work together to ensure that the child suspected of having PANDAS is receiving appropriate medical care and educational services. Further, research focusing specifically on the opinions of medical students in training of Osteopathic Medicine is an area of research that requires further development.

The primary purpose of this study is to 1) Survey medical students at Philadelphia College of Osteopathic Medicine (PCOM) in order to explore PCOM medical students’ awareness of PANDAS, their self-reported level of agreement in the value of providing integrated healthcare collaboration to school psychologists on associated medical and psychological impairments, and to determine important considerations for the pediatric school psychologist to consider in order to maximize opportunity for successful integrated healthcare collaboration, as seen by the PCOM DO student. Secondary goals of this study are to 1) To bring awareness to school psychologists about the specific communication styles and skills desired by future physicians for successful interdisciplinary collaboration, specifically for pediatric cases of suspected or diagnosed PANDAS; 2) To bring awareness to future physicians about the important role that school psychologists play in the coupling of psychosocial care with medical needs; 3) To advocate for the inclusion of instruction regarding interdisciplinary collaboration between physicians and school psychologists to be put in the graduate curriculum at PCOM; and 4) To use the results of this study to educate school psychologists about the

need to expand their role to include: “a) advocacy for the educational needs of children with medical needs; b) evaluation of the efficacy of interventions designed to improve the ability of children with medical conditions to adapt in educational settings; c) promotion of more effective communication between pediatric and educational professionals; and d) collaboration with educational professionals to design programs to promote health among all children and adolescents (Powers & Parrish, 1995).”

## Chapter Two

### Review of the Literature

#### What is Integrated Healthcare?

According to the American Psychological Association (APA) (2008):

“Integrated health care, often referred to as interdisciplinary health care, is an approach characterized by a high degree of collaboration and communication among health professionals. What makes integrated health care unique is the sharing of information among team members related to patient care and the establishment of a comprehensive treatment plan to address the biological, psychological, and social needs of the patient. The interdisciplinary health care team includes a diverse group of members (e.g., physicians, psychologists, social workers, and occupational and physical therapists), depending on the needs of the patient.”

An additional assertion is that “further evidence suggests that coordinated care, which integrates psychologists and other mental health providers within primary care, can enhance access to services, improve quality of care, and lower overall health care expenditures.” Although not specifically implied, school psychologists are positioned to play an integral role in transitioning this model of service delivery to the school setting.

#### In What Settings Can Integrated Care Be Used?

“Integrated health care delivery can occur in multiple settings to benefit individuals across the lifespan. These settings include: primary care, specialized medical settings (e.g., rehabilitation units, cardiology, and surgical centers), long-term care settings, and community-based health and social service sites. The integrated health care team often functions differently according to the setting. However, mutual respect and communication are critical at all sites (APA, 2008).”

### **How do Psychologists Contribute to an Integrated Healthcare Team?**

In the *APA Blueprint For Change: Achieving Integrated Health Care for an Aging Population* (2008), several contributions were offered for consideration, including:

- Conduct cognitive, capacity, diagnostic, and personality assessments that differentiate normal processes from pathology, side effects of medications, adjustment reactions, or combinations of these problems.
- Diagnose and treat mental and behavioral health problems (e.g., depression, suicide risk, anxiety disorders, addiction, and insomnia).
- Offer consultation and recommendations to family members, significant others, and other health care providers.
- Contribute research expertise to the design, implementation, and evaluation of team care and patient outcomes.
- Develop interventions that are responsive to specific individual and community characteristics that may impact the treatment plan. (1)

### **The Impact of Pediatric-Health and Mental-Health Concerns on Functioning in School**

Both acute and chronic health problems are common among school-age children. An estimated 10.3 million children and adolescents in the United States have chronic medical conditions or illnesses that have associated limitations in cognitive, physical, or psychosocial development (Algozzine & Ysseldyke, 2006; Walsh & Murphy, 2003). With more than 95% of youth spending at least 40 hours a week in school (Resnicow, 1993), pediatric illness is estimated to affect an estimated 15% of those students in schools (Brown, 2004; Tarnowski & Brown, 2000). In addition, 52% of students who receive special-education services and 8% of students in general education take

psychotropic medications (Lien, Carlson, Hunter-Oehmke, & Knapp, 1997; Mattison, 1999). With the advances in pediatric medicine and technology, more children with pediatric health issues are attending school; however, research has shown that young adults with childhood-onset chronic illness are at a disproportionate risk of poorer educational and vocational outcomes when compared with those without any chronic illness (Maslow et al., 2011).

Chronic illnesses and disabilities are categorized according to four different categories: *congenital disorders involving the central nervous system (CNS)*, which are those that affect the brain and spinal cord; *acquired disorders of the CNS*; *disorders not primarily involving the CNS*; and *biopsychosocial disorders* (Power et al., 1999). Spina bifida, agenesis of the corpus callosum, and Dandy-Walker Syndrome are examples of congenital disorders involving the CNS that involve physical handicaps and cognitive deficits that often require special-education programming. Traumatic brain injury and PANDAS are acquired disorders of the CNS that may result in sensory, motor, and cognitive impairments impacting on academic and social functioning (Hanson & Clippard, 1992). Asthma is a chronic disorder that does not primarily involve the CNS but still has an impact on school functioning. Biopsychosocial disorders, such as child abuse or other trauma, can result in medical, as well as behavioral and emotional problems, that interfere with a child's ability to be successful in school.

Chronic illnesses have a direct effect on school achievement, with research indicating that 45% of students with chronic illness report falling behind in school (Theis, 1999). An illness or chronic health problem can also impact a child's relationships with peers. The impact that an illness can have on social functioning differs across

developmental stages (Power & Bradley-Klug, 2013). At the onset of the diagnosis and in the early stages of treatment, children may fear social rejection from peers (La Greca, 1990), particularly during adolescence. Children with CNS involvement are at high risk for social impairment associated with neurologically based impairments in social perception and executive functioning (Nassau & Drotar, 1997). Positive peer relationships can serve a primary role in helping a child cope with illness-related stressors (Hartup, 1996).

Children with chronic health concerns are typically more likely than their healthy peers to be absent from school more frequently (Walker & Johnson, 2004). Absence from school disrupts a child's involvement in academic and social activities, which may lead to a sense of isolation in the school environment and a loss of self-efficacy in coping with challenging situations (Power & Werba, 2006). Further, students with chronic illness often experience difficulty when they reenter school after an extended absence partially because school personnel are typically not prepared with a well-developed reentry plan (Kaffenberger, 2006; Shaw & McCabe, 2009). The school psychologist is in an ideal position to facilitate communication and dialogue among all individuals working with a student with frequent absence resulting from chronic illness or mental health needs, which could reduce the stress inherent in the transition for the child (Kleibenstein & Broome, 2000; Wodrich, 2004).

***Impact of Pediatric-Health and Mental-Health Concerns on the Family.*** When a child is diagnosed with a chronic illness, both the nuclear and the extended family systems are affected. Research has identified both negative and positive outcomes associated with a child's chronic illness and the impact on different aspects of family

functioning. Aversive consequences include financial impact, overwhelming time commitments dedicated to maintaining treatment regimens and attending medical appointments, loss of employment, marital discord, exacerbated stress for both married and single parents, disruption to the family and daily routines, unpredictability of the child's prognosis, loss of control, and helplessness (Brown et al., 2008; Power & Bradley-Klug, 2013; Roberts et al., 1998; Robinson, Gerhardt, Vannatta, & Noll, 2007). Positive effects have included increased resiliency in the face of adversity, a more positive outlook on life, treatment other people in a more positive manner, and having an improved ability to make positive plans for the future (Kazak, Stuber, Barakat, & Meeske, 1996).

### **Integrated School Psychological Services**

The role that school psychologists play in schools is evolving at a fast pace. Traditionally, school psychologists have assisted in the identification of students with high-frequency problems, most of which are unrelated to physical health (Wodrich, Kaplan, & Deering, 2006). As chronic health problems now affect an estimated 15% of students at some point in their education (Brown, 2004), contemporary school psychologists can benefit from understanding the impact of health on learning (National Association of School Psychologists, 2002) and the threats they pose to school success (Wodrich et al., 2006). Specifically, chronic illness is associated with risk of grade failure, special-education placement (Gortmaker, Walker, Weitzman, & Sobol, 1990), and behavioral and emotional disorders at greater rates than those experienced by their healthy counterparts (Weiland, Pless, & Roghmann, 1992).

School psychologists provide effective services to help students succeed academically, socially, behaviorally, and emotionally. Within school systems, school

psychologists provide both direct and indirect services to many stakeholders, including students, parents, teachers, administrators, and community members, to name a few.

School psychologists apply their knowledge of both psychology and education during consultation and collaboration, they conduct effective decision making using a

foundation of assessment and data collection, and they engage in specific services for students that focus on academic skills, learning, socialization, and mental health

(National Association of School Psychologists, 2010). The Model for Comprehensive and

Integrated School Psychological Services (2010) represents the official policy of the

National Association of School Psychologists regarding the delivery of comprehensive school psychological services.

According to The Model for Comprehensive and Integrated School Psychological

Services, “school psychologists have knowledge of varied models and strategies of consultation, collaboration, and communication applicable to individuals, families, groups and systems and methods to promote effective implementation of services”

(National Association of School Psychologists, 2010, p.1). Further, “school psychologists

effectively communicate information for diverse audiences, such as parents, teachers and

other school personnel, policy makers, community leaders, and others” (2010, p.1). In

addition, “school psychologists help create linkages between schools, families, and

community providers, and help coordinate services when programming for children

involves multiple agencies” (2010, p.1).

School-age children with disabilities are protected by federal policy and law. The

Education for All Handicapped Children Act (P.L. 94-142) of 1975 and the Individuals

with Disability Education Act (IDEA) (P.L. 101-476), including the IDEA Amendments



of 1997 (P.L. 105-17), identify specific categories of disabilities under which children may be eligible to receive special education and related services. As defined by IDEA, the term "*child with a disability*" means a child "with mental retardation, hearing impairments (including deafness), speech or language impairments, visual impairments (including blindness), serious emotional disturbance, orthopedic impairments, autism, traumatic brain injury, other health impairments, or specific learning disabilities; and who, by reason thereof, needs special education and related services."

The category of other health impairment (OHI) was included in 1990:

“Other health impairment means having limited strength, vitality or alertness, including a heightened alertness to environmental stimuli, that results in limited alertness with respect to the educational environment, that – (i) Is due to a chronic or acute health problem such as asthma, attention deficit or attention deficit hyperactivity disorder, diabetes, epilepsy, a heart condition, hemophilia, lead poisoning, leukemia, nephritis, rheumatic fever, sickle cell anemia; and (ii) Adversely affects a child’s educational performance (Individuals With Disabilities Act, 1991, P.L. 102-119, 20 U.S.C., 1401 [a][1]).”

With the addition of OHI, services may be provided to students with special needs who lack the necessary requirements under the customary designations of *Specific Learning Disability*, *Mental Retardation*, or *Emotional Disturbance* (Grice, 2002).

To determine eligibility, a school psychologist, along with the child’s multidisciplinary team must determine whether (a) the child has one or more of the disabilities listed and (b) he or she must require special-education and related services. Children with certain chronic illnesses (e.g., PANDAS) may not qualify as having a

disability under IDEA and, therefore, may not have access to additional supports that have been found to be effective in improving educational outcomes for children with disabilities (Cartwright, 2007). Research has suggested that allowing children with chronic illness to qualify for types of support similar to those that their classified peers are eligible to receive without having to meet the formal criteria for receiving an Individualized Education Program, a means for increased educational support through IDEA, could improve their educational and occupational outcomes (DuPaul, Power, & Shapiro, 2009; Madan-Swain, Katz, & LaGory, 2004).

Another way to ensure protection for a “person with a disability” is through Section 504 of the Vocational Rehabilitation Act (later incorporated into the Americans with Disabilities Act, 1990; Wodrich et al., 2006). According to this Act, an individual with a disability is defined as “one who has a physical or mental impairment that substantially limits a major life activity such as learning” (Section 12102). The use of Section 504 or OHI under IDEA are well suited for children who may require assistance because of their health needs but may experience only minor academic, developmental, or adjustment problems (Wodrich et al., 2006).

### **The History of Pediatric Psychology**

Pediatric psychology, as a secular specialization, has evolved over the past 3 decades to address the psychological problems experienced by children with medical conditions (Roberts & Steele, 2009); however, attempts to merge the collective needs of psychology and pediatric medicine have been evident in the literature for the past century. The fields of clinical psychology and pediatrics have been uniquely distinguishable from each other as each has evolved, although both emerged as specializations of childhood at relatively the same time in history. The Section on

Pediatrics of the American Medical Association was founded in 1880 (Schlutz, 1933), while the field of clinical psychology was first coined in 1896 by Lightner Witmer (Watson, 1953).

Undertones of their compatibility first emerged in 1911 when the APA established a committee on the relations between psychology and medical education (Fernberger, 1932). A primary task of this committee was to survey medical schools for opinions about what the fields of general psychology and clinical psychology could offer medical education. Seventy-one medical schools replied, with respondents viewing both general psychology and clinical psychology as having something to offer medical education; however, much elements of psychology were interjected much later into medical curricula (Routh, 1975).

In the 1920s, both pediatrics and clinical psychology underwent several contemporary advances. Pediatrics became strongly embedded in the laboratory investigation of the specific etiological basis for pathologies exclusive to children and their subsequent treatments (Richmond, 1967). At the same time, many child development institutes were established by universities and the interdisciplinary Society for Research in Child Development was founded (Routh, 1975). Anderson (1930), the director of the Institute of Child Development at the University of Minnesota, advocated for the usefulness of psychologists to their pediatric counterparts in several ways, including intelligence testing and child rearing.

With such medical advances as prophylactic immunization, widespread vitamin usage, water purification and treatment, and antibiotic use, to name a few (Richmond, 1967), the beginning of the 1940s saw a pivotal shift in the number of children surviving

disease; however, a significant number of those children experienced delay or impairment in their development (Routh, 1975). Unfortunately, at this time in the history of clinical psychology, the primary research foci had shifted to animal learning (Skinner, 1938) and adults, as the Veterans Administration began its training program in clinical psychology. The availability of grants and additional research funding was promising for the field of clinical psychology, even if it meant temporarily redirecting research and treatment efforts away from children. As the United States entered the postwar era, an increasing number of psychologists were employed in medical schools in various capacities (Mensch, 1953), which was highly important in the foundational efforts of the collaborative partnership between psychologists and physicians.

In the mid-1950s, the field of clinical psychology saw a reemergence of child-centered service delivery, thanks in part to postwar federal funding. An early nod to the ultimate development of pediatric psychology can be attributed to the federally funded doctoral program in the psychology of mental retardation at George Peabody College, since several of the presidents of the future Society of Pediatric Psychology graduated from this program (Routh, 1975). At this time in history, the United States went through a period of economic revitalization, with increased urban and suburban growth. With this advancement, the role of the pediatrician changed considerably from “the curer of disease,” as mortality death rates were considerably lower as a result of increased disease containment, to “advice giver,” as mothers were turning to their child’s pediatrician for child-rearing advice that previously had been given by family members and close neighbors (Routh, 1975).

In response to this new trend, Wilson (1964) advocated for the role of the psychologist in medical settings by asking the question, “Who is to attend to the common emotional or behavioral problems of children?” in a presidential address to the American Pediatric Society. He proposed the following:

“I feel very strongly that one of the things I would do if I could control the practice of pediatrics would be to encourage groups of pediatricians to employ their own clinical psychologists. Such an approach, it seems to me, is the only practical step to aid us in solving many of the problems in childhood and adolescence” (p. 988).

In conjunction with Wilson’s vision, U.S. federal legislation and the founding of the National Institute of Child Health and Human Development in 1962 supported the need to increase the presence of psychologists in the medical field (Routh, 1975). These visionary steps led to the first formal graduate program to train *pediatric psychologists* at the University of Iowa in 1966 (Routh, 1969).

The first conceptualization of the responsibilities of a pediatric psychologist was described by Logan Wright in 1967. His article, “Pediatric Psychology: A Role Model,” first appeared in the *American Psychologist* and is one of the most cited references in the subsequent literature on pediatric psychology (Routh, 1975). He defined the role as “any psychologist who finds himself dealing primarily with children in a medical setting which is nonpsychiatric in nature” (Routh, 1975, p. 323). Current roles of pediatric psychologists have evolved to include understanding the psychological problems often encountered by children with specific medical conditions and collaborating with medical professionals and parents in the treatment of associated physical, behavioral, and

emotional problems (Power & Parrish, 1995). Additional responsibilities include the promotion of health behaviors and the prevention of problematic health effects.

### **Pediatric Psychology in the Schools**

Pediatric psychologists typically do not have the necessary training to work in school systems. Conversely, school psychologists' training is richly embedded in assessment and intervention, as they apply to the academic environment, but is lacking in emphasis on risk prevention and general health promotion (Power, 2000). Brown (2004) viewed pediatric psychologists and school psychologists as more similar than different. He argued that health care reform expands the role of psychologist to health care provider with the delivery of services applying both to the medical setting and the school setting to support continuity of care for all children, especially those affected by illness. Power, Shapiro, and DuPaul (2003) further assert that

“the distinguishing feature of pediatric school psychologists is not the graduate program within which they receive their training (e.g. clinical vs. health vs. school), but the developmental/systems approach they use in understanding children and intervening to promote healthy and successful development especially in schools” (p. 3).

Children typically grow up connected to several support systems within the domains of family, school, and health care. The successful interplay of these various domains can promote resiliency and better outcomes in life. Given that the majority of a child's development through age 18 years occurs during a period of time when that individual attends school, it is particularly important for service providers to understand

the concerns that can arise when mitigating health or mental-health factors interfere with academic performance. As Power and Bradley-Klug (2013) described it in the following:

Failure in school is a strong risk factor for poor outcomes in life; it initiates a process of disengagement that can result in school dropout, increased risk for unhealthy patterns of behavior and psychopathology, and enhanced likelihood of relationship problems in adolescence and adulthood (p. 1).

Addressing the health-care-related needs of students requires the coordination of care across multiple systems (Nastasi, 2000). Power and Bradley-Klug (2013) described pediatric school psychology as “a subset of child-serving psychology that is focused on the promotion of children’s health and development through the coordination of efforts across systems, including family, school, health system, and community agencies, with a particular emphasis on fostering success in school” (p. 2).

### **Theoretical Foundations of Pediatric School Psychology**

Pediatric school psychology promotes interdisciplinary collaboration among members of different systems. Strong intersystemic relationships require that professionals from various disciplines understand what others can contribute to the collaboration efforts on behalf of children and adolescents in need. In general, both school psychologists and pediatric school psychologists need to understand and incorporate multiple theoretical models into their work in order to be able to work more effectively with a wider range of professionals who practice within different theoretical models.

**Medical Model.** The medical model regards symptoms and behaviors as indicative of an underlying physical or biologically based abnormality within the individual. It is the dominant archetype used by medical and mental-health providers. In

adherence to this model, the medical provider is trained to obtain a medical history, conduct a physical examination, and order any necessary tests to assist with an appropriate diagnosis for a specific illness or disease. Adherence to established criteria is necessary to rule in or out certain diagnoses. Social and environmental factors are not highly emphasized in this model of care.

Providers of mental health care use the *Diagnostic and Statistical Manual of Mental Disorders*, now in its fifth edition (*DSM-V*; American Psychiatric Association, 2013), to classify psychiatric disorders. Each diagnosis has its respective set of criteria delineating the symptoms that must be present, their minimal duration needed, and the impact the symptoms have on functional performance in order to be diagnosed with that particular disorder. PANDAS is so controversial in part because the criteria are still highly subjective and not universally accepted within the medical field.

***Psychometric Model.*** Psychometrics is concerned with the measurement of human characteristics. The psychometric model emphasizes that individuals differ from one another on numerous dimensions of physical, cognitive, learning, behavioral, social, and emotional functioning (Power & Bradley-Klug, 2013). Assessment measures within the psychometric context provide information about an individual's functioning relative to a particular construct along a continuum rather than to a dichotomous description of normal versus abnormal. Avoiding such absolutes permits the examiner to report the relative severity of a dimension of functioning (Achenbach & Rescorla, 2001).

Psychologists in the school setting typically adhere to the psychometric model when conducting services to determine eligibility for special-education and related services. Per best practice criteria and state and federal mandates, multiple methods of



assessment and informants are used to collect information about a child. These measures may include self-reports, caregiver and teacher reports, direct assessment, and direct observation. Power and Eiraldi (2000) identified limitations to this model, which include its failure to account for contextual and cultural factors and its limited efficacy in designing intervention strategies. Deficit identification is a key focus of this model; however, the emergence of a strength-based approach to assessment has emerged with promise (Power & Bradley-Klug, 2013).

***Neuropsychological Model.*** For many centuries, the brain was considered to be a useless organ. Hippocrates was one of the first to draw a connection between the brain and behaviors of the body (Finger, 2000). In particular, neuropsychology concerns the impact of the brain and nervous system on one's daily functioning. Simply stated, it is the study of brain-behavior relationships. The 1990s were called the "Decade of the Brain," but the field of neuropsychology continues to evolve at a rapid pace as advances in technology and imaging permit health-care professionals to see the intricacies of the anatomical structures that permit the brain to function (Miller, 2010).

A major focus of clinical neuropsychology is the assessment and management of cognitive and behavioral changes that result from brain injury or disease (Mendoza & Foundas, 2010). The goal of neuropsychological assessment is to provide a set of methods to understand the relationship between structures and functions of the brain and processes of learning and execution (Levin & Hanten, 2005), either in cases where individuals are known to be suffering from identified neurological insults or when differential diagnosis is needed in cases of questionable insults to the CNS (Mendoza & Foundas, 2010). Neuropsychological tests are given to establish baseline levels of

functioning, monitor progress over time, and evaluate responses to intervention (Power & Bradley-Klug, 2013).

Once reserved for the field of clinical psychology, school neuropsychology is now considered to be an emerging specialty in the practice of school psychology (D'Amato, Fletcher-Janzen, & Reynolds, 2005; Hale & Fiorello, 2004; Miller, 2010;). Standard school-based evaluations typically entail assessment of intellectual ability and academic achievement. School neuropsychological assessments typically assess for a wider variety of neurocognitive domains such as sensory-motor functions, attention processes, visual-spatial processes, language processes, memory and learning processes, executive functions, speed and efficiency of cognitive processing, general intellectual ability, academic achievement, and social-emotional functioning (Miller, 2010). The comprehensive nature of the evaluation provides a wealth of information about the individual's functioning, but this evaluation model is time consuming and limited with regard to intervention planning for educational and behavioral needs (Power & Bradley-Klug, 2013).

***Behavioral Analytic Model.*** The behavioral analytic model, also referred to as functional behavioral assessment (Power & Bradley-Klug, 2013) is rooted in behaviorism (Watson, 1913) and radical behaviorism (Skinner, 1953). This model emphasizes the interaction between the individual and the environment and the way environmental events shape an individual's behavior. The behavior analytic model focuses on the analysis of a behavior to determine the function of the behavior (Catania, 1998). The targeted behavior is then linked to antecedents and consequences through direct observation to establish a synthesized sequence of events. Following this linkage, one can

then attempt to understand and predict the occurrence of problem behaviors (Steege & Watson, 2009).

A behavioral analytic model typically views behavior as having two main functions: positive reinforcement and negative reinforcement. In operant conditioning, positive reinforcement involves the addition of a reinforcing stimulus following a behavior that increases the likelihood that the behavior will occur again in the future (e.g., access to privileges, tangible rewards, preferred attention). Negative reinforcement should not be equated with punishment, but simply the act of encouraging a desired response by using an unpleasant stimulus (e.g., escape from an undesirable event).

***Cognitive-Behavioral Model.*** The cognitive-behavioral model represents two interacting theoretical perspectives: cognitive and behavioral. From a behavioral perspective, clinicians examine environmental influences and experiences to help understand, or conceptualize, a child's problems. Specifically, behavioral components can be environmental or skill deficits (Mennuti, Christner, & Freeman, 2006). From a cognitive perspective, it is important for a clinician to consider two factors- cognitive distortions and cognitive deficiencies (Kendall & MacDonald, 1993). Collectively, then, the premise of cognitive-behavioral theory is that an individual's thoughts and feelings influence his or her behavior.

The cognitive-behavioral model has been well documented as useful in planning interventions for children with a range of health and mental health conditions, including anxiety and depression, posttraumatic stress, pain, attention-deficit/hyperactivity disorder (ADHD), and Autism Spectrum Disorder (Mennuti, Christne, & Freeman, 2006; Power

& Werba, 2006). Many cognitive-behavioral interventions have been demonstrated to be effective, this qualifying them as evidence-based interventions.

***Developmental-Ecological Model.*** The developmental-ecological model is patterned after Bronfenbrenner's (1979) developmental-ecological theory. According to Bronfenbrenner's theory, individuals live within webs of social relationships. As such, this model provides a useful framework for understanding transactions between the developing child and the changing contexts in which the child develops (Kazak, Rourke, & Navsaria, 2009) and for clarifying as to how a single event or problem has multiple causes (Dalton, Elias, & Wandersman, 2007).

The model emphasizes the importance of intersystem dynamics, such as family-school relationship, school-health system relationship, and family-health system interaction (Power & Bradley-Klug, 2013), but it lacks measurement methods to assess important interpersonal and intersystemic constructs (Power et al., 2003). The systems closest to the individual and involving the most personal contact are termed *proximal* systems. The more distal systems, those with less direct closeness to the individual, have less immediate, yet expansive effects.

According to Bronfenbrenner's (1979) model, the levels of analysis are termed: *Microsystems, Organizations, Localities, and Macrosystems*. Microsystems are environments in which the individual has repeated, direct interpersonal interaction with others. These environments include families, friends, classrooms, teams, etc. The next layer of the model identifies Organizations, which are larger than Microsystems and involve a formal structure, such as schools, religious congregations, community coalitions, and local business. Localities usually have ties to government, educational

systems, local economies, health services, social services, etc., and can be neighborhoods, cities, towns, rural areas, etc. (Dalton et al., 2007). The most distal layer of the model is the Macrosystem, which represents societies, cultures, social movements, corporations, social forces, belief systems, etc., that exercise influence through policies, legislation, court decisions, social norms, and ideologies (Dalton et al., 2007).

### **Hallmarks of Pediatric School Psychology**

Pediatric school psychology entails a balanced approach in the promotion of the health and development of children. Essentially, there are four defining features of pediatric school psychology. These features include a focus on a continuum of services across varying levels of prevention and intervention, an emphasis on positive psychology, a multisystemic approach to working with children that involves building relationships across systems of care and across disciplines, and the use of a partnership-based model to promote competence and solve problems (Power & Bradley-Klug, 2013).

*Continuum of Services.* Traditional service delivery models for addressing the needs of children in schools have been mainly reactive in nature. More contemporary approaches to working with youth include prevention services (Power & Bradley-Klug, 2013). Pediatric school psychology views service delivery on a continuum of care, offering both prevention and intervention services to children (Weist, 2001). The continuum of services is visualized as a figure of concentric circles. At the extreme outer layer of the continuum of prevention services is universal prevention, followed by selective prevention and indicated prevention. As the continuum approaches the center, the intervention services follow the prevention services, with early intervention next, followed by intervention, and, lastly, crisis intervention at the core of the model.

Universal prevention efforts are offered to the general population of children and youth in a setting prior to the onset of problems. Children identified as being at risk for that particular condition would be targeted for the implementation of techniques to prevent further development of the condition (Luginbuehl, Bradley-Klug, Ferron, Anderson, & Benbadis, 2008). An example of a universal prevention strategy would be a universal prevention intervention for substance abuse, which would include substance abuse education using school-based curricula for all children within a particular school district.

The selective-prevention level targets individuals who may be at risk for a particular problem based on their membership in a particular group. Selective-prevention services also can be administered to children with chronic health conditions who are classified at risk for social and emotional difficulties by virtue of their health condition (Lemanek & Ranalli, 2009). An example of a selective-prevention strategy for substance abuse includes special groups for children of substance-abusing parents or for families who live in neighborhoods where drug activity is prevalent.

Indicated prevention targets individuals who are at risk for developing health or mental-health problems or children with a chronic illness who are at risk for further complications (Kazak et al., 2007). Indicated-prevention programs may also target individuals who exhibit risk factors, such as school failure, interpersonal social problems, delinquency, depression, etc. An example of an indicated substance-abuse prevention initiative would be a program for middle school students who are experiencing a number of problem behaviors and early signs of substance abuse.

Early-intervention services can be classified several ways. First, early-intervention services can be viewed as services provided to individuals who are at the beginning stages of coping with a problem (Power & Bradley-Klug, 2013). Early-intervention services are also provided to select groups of students in school systems, usually between the developmental periods of infancy and preschool and advancing from elementary to middle school. Early intervention services also can be recommended for children in the early stages of coping with a problem after the onset of an illness.

Intervention services are designed for children who evidence behaviors or symptoms related to a particular diagnosis or problem. Intervention options typically draw on evidence-based practices that have been validated as effective treatment options to remit the associated symptoms of a particular impairment. Evidence-based interventions could include parent training, school-based behavioral approaches, and medication (Power & Bradley-Klug, 2013).

The most intensive service offering involves crisis intervention. This level of intervention is reserved for individuals who need immediate or urgent assistance as a result of the personal experience of an event that produces emotional, mental, physical, or behavioral distress or problems. A crisis can be conceptualized as a situation in which the individual perceives a sudden loss of his or her ability to use effective problem-solving and coping skills. The goals of crisis intervention are to assist the individual in recovering from the crisis and to prevent serious long-term problems from developing.

**Positive Psychology.** Positive psychology is one of the newest recognized branches of psychology. It has existed for fewer than 2 decades and became popular when Martin Seligman was elected president of the APA in 1988. With an emphasis on

happiness and human strengths (Seligman & Csikszentmihalyi, 2000), positive psychology is the study of happiness through the investigation of one's subjective well-being (Diener, Eunkook, & Lucas, 1999). The main elements of subjective well-being include positive affect, negative affect, and life satisfaction (Power & Bradley-Klug, 2013). With a primary emphasis on prevention, pediatric school psychology embodies the basic tenets of positive psychology.

Prior to World War II, psychology was focused on making the lives of all people more productive and fulfilling, in addition to identifying and nurturing high talent (Seligman, Steen, Park, & Peterson, 2005). Post World War II, the primary focus of psychology shifted to treating maladaptive behavior and mental disorders. In the 1950s, the emergence of humanist and existential thinking transformed psychology, yet again, by a resurgent focus on more positive aspects of human nature. Humanist thinkers, such as Carl Rogers and Abraham Maslow, as well as Albert Bandura's social learning theory (1977), all served as catalysts to the advancement of positive psychology.

The positive psychology movement is not without its critics. Common criticisms include the perception of a prescriptive, idealistic, and moralistic ideology; the preference of certain modes of functioning over others; the failure to challenge faulty systems; and the responsibility placed on the individual to make required changes (Ehrenreich, 2009; Lazarus 2003; Norem, & Chang, 2002). As it stands today, positive psychology does not imply that psychology should ignore or dismiss the real problems that people experience, nor does it imply that the rest of psychology needs to be discarded or replaced (Peterson, 2008). Instead, it is viewed as a complement to traditional psychological theories that focus on treating abnormal behavior and mental illness.



The traditional approach to assessing youth with physical or mental illness employs the use of the medical model to determine if the child meets specified diagnostic criteria (Power & Bradley-Klug, 2013). This model does not include wellness promotion or illness prevention, and it lacks in the identification of protective and promoting factors related to wellness (Patel & Goodman, 2007). Life satisfaction, as a global construct, is the overall evaluation of one's life (Diener, 1984), with implications as a protective factor for youth with physical or mental illness. In particular, life satisfaction can serve to facilitate adaptive responses to stressful life events in youth (Huebner, Suldo, & Gilman, 2006). Additional protective factors include family communication, peer relationships, participation in activities that are meaningful, and relationships with teachers (Power & Bradley-Klug, 2013). Although in its infancy, the relationship between subjective well-being and physical health continues to be researched; however, there is little doubt that the application of positive psychology to youth with physical and mental health illness is useful in assessing the components that promote subjective well-being and prevent further difficulties.

***Multisystemic Approach.*** Socialization always occurs within a particular context. That specific context is tied to other contexts, which are linked to other contexts, and so on. For example, a child is studied in the context of developmental theory, which is nested in the context of family, which lies in the context of community (Gonzalez-Mena, 2006). No child is void of a context. To intervene with a child without understanding that child's ecological context, is to not fully understand all of the influences that affect the child.

The multisystemic approach in the promotion of child development is anchored to the developmental-ecological model (Bronfenbrenner, 1979). In Bronfenbrenner's ecological model of human development, the child is at the center of a set of hypothetical concentric circles, which form a set of contexts in an overarching system of time. This system of time influences all the contexts and continually changes them. The smallest of these contexts in which a child is embedded is the Microsystem. The Microsystem is made up of the people and the institutions the child interacts with directly. Examples include immediate family members, school teachers, peers, childcare providers, and religious institutions. A younger child typically has a smaller number of Microsystems than an older child.

The Mesosystem relates to the interactions the people in the Microsystems have with each other on behalf of the child, but the child is not directly involved with the Mesosystem. Examples of Mesosystems include parent-teacher interactions, parent-childcare interactions, and neighbor-neighbor interactions. The Exosystem's layer relates to the broader community in which the child exists. Examples include extended family networks, mass media, social welfare services, and community health systems. The outer layer of the model is called the Macrosystem, which contains attitudes and ideologies, values, laws, and customs.

The developmental-ecological model emphasizes the importance of contextual and relational factors within systems and the effect of within-system dynamics on functioning in other systems (Power & Bradley-Klug, 2013). It also emphasizes between-system connections. As an example, strong family-school connections have been shown to have a positive effect on a child's functioning in school (Sheridan & Kratochwill,

2008). There is also evidence to support that the quality of the relationship between family and health care provider can have a beneficial effect on the management of children with special health care needs (Starfield & Shi, 2004).

***Partnership-Based Programming.*** The success of prevention and intervention efforts relies heavily on effective partner-based programming. Partnerships include relationships among family, school, and health care providers, otherwise known as stakeholders. Partnership-based approaches emphasize a nonhierarchical and fully collaborative relationship (Power & Bradley-Klug, 2013). The participatory intervention model emphasizes that all key stakeholders must be actively involved in the process of designing, implementing, and evaluating the intervention (Nastasi, Moore, & Varjas, 2004). Partnership-based programming also asserts that program development and implementation is an iterative process that promotes empowerment among participants.

### **Intervention Approaches Used in Pediatric School Psychology**

***Developmental-Ecological Model.*** The developmental-ecological model emphasizes the critical importance of relationships and contexts for the successful development of the individual (Kazak et al., 2009). A primary intervention goal of this model is to strengthen relationships within systems and to foster partnerships between systems. This model also highlights the importance of considering policy, cultural, and economic issues that impact system functioning (Power & Bradley-Klug, 2013).

Subsumed in this model, the professional assumes an advocacy role to address policy issues at a local, state, or national level that might be barriers to care or that create an unjust situation for a child or family (Power, Eiraldi, Clarke, Mazzuca, & Krain, 2005).

***Partnership Model.*** In a partnership model, key participants work collaboratively with one another, each respecting the unique and complementary expertise that all

participants contribute to the effort. The relationships are nonhierarchical, with each member having an equal opportunity to determine goals, strategies, and roles respective to providing care to the individual (Nastasi et al., 2004). Inherent in this model is the belief that effective health care requires adaptation over the course of the individual's illness, as the frequency and intensity of specialized needs and circumstances change over time; therefore, the process of collaboration needs to be dynamic and responsive (Power & Bradley-Klug, 2013).

***Help-Seeking Model.*** Interventions have the most opportunity to yield success when participants are ready to seek help and become active participants in the process. Anderson (1995) has identified four stages of help seeking: problem recognition, decision to seek help, service selection, and intervention implementation, with sequential movement between stages. Each stage has its own associated barriers to individuals and families seeking help that may limit progression to the next stage; therefore, barrier identification is useful in developing strategies to promote intervention engagement (Power & Bradley-Klug, 2013).

In the first stage, problem recognition, factors contributing to limited progression include functional impairment, perceived family burden, parent-child relationship, parental psychopathology, and marital conflict (Eiraldi, Mazzuca, Clarke, & Power, 2006; Power, Eiraldi, Clarke, Mazzuca, & Krain, 2005). In the second stage, decision to seek help, factors that inhibit progression to the third stage may include stigma of mental-health care, family trust in health system, acculturation, health locus of control, and knowledge of disorder (Eiraldi et al., 2006; Power, Eiraldi, Clarke, Mazzuca, & Krain, 2005). In the third stage, service selection, accessibility of services, social and economic

resources of family, social support, treatment acceptability, and cultural sensitivity of professional staff may be barriers to progression (Eiraldi et al., 2006; Power, Eiraldi, Clarke, Mazzuca, & Krain, 2005). Lastly, in stage four, intervention implementation, evidence supports that such factors as staff support in overcoming barriers, quality of care, coordination of services, demands of treatment, and side effects are important to monitor when working with individuals with ongoing treatment needs (Eiraldi et al., 2006; Power, Eiraldi, Clarke, Mazzuca, & Krain, 2005).

***Cognitive-Behavioral Model.*** Coping with chronic illness can present a unique set of challenges to a child's psychosocial and emotional functioning. Cognitive-behavioral interventions include the identification and reframing of cognitive distortions associated with maladaptive patterns of behavior (Rofey et al., 2008). Cognitive-behavioral intervention programs that teach the active use of coping strategies may prevent children with chronic illness from developing psychosocial and emotional difficulties (Scholten et al., 2011). Specifically, interventions that focus on improving one's understanding of an illness and its treatment, changing perceptions of symptoms, or altering one's approach to problem solving have evidenced success in treating health conditions and mental-health disorders (Power & Werba, 2006).

Pediatric psychologists advocate for the inclusion of parents in the planning, delivery, and assessment stages of intervention development. They routinely design interventions that promote an increase in knowledge and an improvement in coping skills (Power & Bradley-Klug, 2013). Involvement of parents in the intervention program has been shown to enhance the use of learned coping strategies on a daily basis (Scholten et al., 2011).

***Behavioral Model.*** Interventions that are based on behavioral psychology attempt to modify a person's behavior by analyzing and manipulating the antecedents and consequences to behavior. As it relates to pediatric psychology, behavioral interventions are those that are designed to modify behavior to improve health or to prevent illness. Behavioral interventions have been found to be effective in treating health and mental conditions (McGinness & Foege, 1993). Behavioral interventions shown to be effective in treating individuals with physical and behavioral health concerns include self-control strategies, token economies (Ayllon & Azrin, 1968; Bernard, Cohen, & Moffett, 2009), behavioral contracts (O'Banion & Whaley, 1981), skills training, behavioral rehabilitation, and behavioral family management.

### **Theoretical Models of Collaboration**

Children with pediatric illness or chronic disability typically have needs that are more complex than those of their healthier peers. To effectively support these needs in school settings, consultative efforts from the multiple systems involved with that child are optimal (Grier & Bradley-Klug, 2011). While most professionals can identify the benefits of consultation and collaboration, effective consultation and collaboration can be difficult to achieve. This is, in part, caused by the theoretical difference in approaches used for collaboration by varying individuals; therefore, pediatric school psychologists must understand the theoretical foundation of each model, as each differs in conceptualization of the consultative relationship, nature of the problem, goals, methods of intervention, and criteria used to evaluate efficacy of the collaboration (Christner, Lennon, & Stewart, 2006).

***Mental-Health Collaboration.*** Mental-health collaboration is not a new concept, having had support in the literature base for several decades. In sum:

Mental health collaboration is a service provided to caregiving professionals such as doctors, nurses, teachers, lawyers, welfare workers, probation officers, police, and clergy to assist them in dealing with the psychological aspects of a current work problem and, most important, to deal more effectively with similar problems in the future (Brown, Pryzwansky, & Schulte, 2001, p. 19).

The concept of mental-health collaboration was first introduced in the 1960s by Gerald Caplan when he described the deployment of mental-health professionals to a broad array of human service enterprises to help staff members in those programs better understand and support their clients' mental health needs (Caplan, 1964). Caplan's (1970) *The Theory and Practice of Mental Health Consultation* serves as an early reference guide for the service delivery model of mental-health collaboration.

Characteristics of Caplan's (1970) model include a nonhierarchical collaborative relationship between the consultant and the consultee on behalf of the consultee's client or patient. The nature of the problem is confined to the work setting, and the problem is something related to some aspect of the client's mental health for which the consultee is seeking assistance. The consultant has no administrative responsibility for the consultee's work, and the consultee is under no obligation to participate in the relationship. The goal of mental-health collaboration is to improve the consultee's ability to handle the presenting problem more effectively, while teaching the skills necessary for the professional to master future problems of a similar nature. Through a series of interviews, the consultant and the consultee define the problem and develop an intervention plan.

There are four types of mental-health collaboration. Client-centered case collaboration emphasizes a primary goal of developing a plan for handling the client's difficulties. Consultee-centered case collaboration has a primary focus, the remediation of the consultee's work-related difficulty, with a secondary benefit of client improvement. In consultee-centered case collaboration, the consultant assesses whether the difficulty stems from a lack of knowledge, lack of skill, lack of confidence, or lack of objectivity resulting from interpersonal difficulty between the consultee and the client. The third type of mental-health collaboration is program-centered administrative collaboration, which has as its primary focus the development of an action-oriented plan that can be implemented by the consultant or associates to resolve the administrative problem. The fourth type of mental-health collaboration is consultee-centered administrative collaboration. The goal of this method is to help the consultee improve problem-solving skills in dealing with current organizational problems.

With the initiative to provide mental-health services to children in school settings well underway, the mental-health model of collaboration has been expanded and modified to be applicable to the school setting (Meyers, 1981; Meyers & Kundert, 1988; Meyers, Parsons, & Martin, 1979). Meyers et al. (1979) identified three levels of mental-health collaboration delivery in schools, with a strong emphasis on primary prevention efforts. Level 1 collaboration focuses on the child. At this level, the consultant might work with the teacher to develop strategies for dealing with a student-centered problem. Level 2 focuses on the teacher. A consultant might work with a teacher regarding instructional or classroom management strategies, for example. At Level 3, the focus of



collaboration is on the system. At this level, faculty may be trained on evidenced-based instructional strategies to implement in the classroom.

***Behavioral Collaboration.*** Behavioral collaboration is based on behaviorism. The basic tenet of behavioral theory is that all behaviors are learned and that the establishment, maintenance, and modification of behaviors can be explained through a functional assessment of the interactions of the individual, his behavior, and the environment (Zins, Kratochwill, & Elliott, 1993). Simply stated, behavioral collaboration is defined as the following:

“an indirect, problem-solving service involving a collegial relationship between the consultant and the consultee in which the consultant acquires and communicates psychological data germane to the consultee’s problem as well as the psychological principles that will enable the consultee to utilize the data” (Brown et al., 2001, p. 48).

Data collection methods in behavioral collaboration are systematic, requiring specific input from the consultee through a structured interview process. Data are defined in observable, measurable, and quantifiable terms. A particular hallmark of behavioral collaboration is the identification of environmental antecedents, or triggers to behavior, as the powerful points to initiating change. The systematic collection of data during collaboration includes the linkage of assessment, intervention, and evaluation. Bergan and Kratochwill (1990) have identified four fundamental steps in the behavioral collaboration process: (a) problem identification, (b) problem analysis, (c) plan implementation and progress monitoring through ongoing data collection, and (d) problem evaluation.

***Conjoint Behavioral Collaboration.*** Conjoint behavioral collaboration is an extension of behavioral collaboration. Its emphasis is on the promotion of a collaborative problem-solving relationship between the identified child's parents and professionals working with that child to address the child's academic, social, or behavioral needs (Sheridan et al., 1996). Conjoint behavioral collaboration assumes an ecological-behavioral perspective, a cooperative interactive home-school relationship, and a shared implication in the problem and resolution (Christner et al., 2006). Following the same four steps outlined in the behavioral collaboration model (i.e., problem identification, problem analysis, plan implementation and progress monitoring, and problem evaluation), conjoint behavioral therapy relies on the sharing of information and resources to obtain a clear conceptualization of the problem and increase the range of solutions (Sheridan et al., 1996).

***Problem-Solving Collaboration.*** Problem-solving collaboration is also commonly referred to as school-based collaboration. Problem-solving collaboration is a method of psychological service delivery in which a school psychologist (i.e. the consultant) works together with a teacher and/or a parent (i.e., the consultee) to identify and analyze a particular problem with a student (i.e., the client) and then to create an intervention plan that the teacher or parent can implement with or without support (Feldman & Kratochwill, 2003). Problem-solving collaboration, then, aims to provide solutions to change a child's behavioral, academic, or social problem in the short term, while facilitating the consultee's independent productive thinking and development of skills to solve similar problems in the future (Kratochwill, Elliott, & Callan-Stoiber, 2002).

The problem-solving approach is conceptualized according to five basic tenets, which include (a) perception of the problem, (b) problem attribution, (c) problem appraisal, (d) perceived control, and (e) time/effort commitment (D’Zurilla & Nezu, 1999). D’Zurilla and Nezu (1999) also identified four basic problem-solving steps. The first step is problem definition and formulation, which entails gathering information, clarifying the nature of the problem, and setting goals. The second step involves generating alternative solutions to the problem in order to provide the consultee with a host of alternatives in order to establish the “best-fitting” solution. The third step involves making a decision about which solution to implement, followed by the last step, which is solution implementation and verification. Problem-solving collaboration involves the use of direct didactic methods, which are employed through the use of guiding, Socratic questioning, modeling, rehearsing, performance feedback, positive reinforcement, and shaping (Christner et al., 2006).

***Family Systems Collaboration.*** In similar fashion to conjoint behavioral collaboration, family systems collaboration is an extension of behavioral collaboration, with the difference being that the family *system* is the client. Family systems collaboration is rooted in family systems theory (see Bowen, 1978). In the family systems model of collaboration, the belief rests on the perspective that difficulties in family functioning stem from the behavioral expressions of the “dysfunctional member,” while acknowledging that the behaviors of each member are interdependent, so that changing the behaviors of one member, results in changes in the other members of the family system (Mullis & Edwards, 2001). The process of successful differentiation is one tenet of family systems theory, as described by Kerr and Bowen (1988):

It is the *basic* level of differentiation that is largely determined by the degree of emotional separation a person achieves from his family of origin. . . basic level is fairly well established by the time a child reaches adolescence and usually remains fixed for life, although unusual life experiences or a structured effort to increase basic level at a point later in life can lead to some change in it (p.98).

***Biopsychosocial Model.*** Both medicine and psychology have historical roots in the Cartesian view that the mind and body are separate entities. For example, physicians are trained to treat the body, and psychologists are trained to treat the mind. As a result of Cartesian principles, the health care system is organized around the treatment of different body parts; however, physical and psychological experiences mostly occur in tandem. Decades of research, have well documented that biological, psychological, and social experiences interact and influence each other in complex ways (McDaniel, 1995).

In the 1970s, physicians were practicing medicine in accordance with the biomedical model. In 1977, Engle introduced the “*biopsychosocial model*” to designate an integrated approach to medical problems with the capability of moving from the molecular level to the societal level of analysis and intervention, depending on the nature of the program (McDaniel, 1995). The biopsychosocial model is one of the first approaches that linked systems theory to the study of disease and medical care (Grier & Bradley-King, 2011). It is well known in the field of medicine for its focus on health care utilization (Borrell-Carrio, Suchman, & Epstein, 2004).

## **Physicians and Psychologists (School and Pediatric): What They Have to Offer Each Other**

Children with health impairments need physicians and psychologists to interact collegially with one another. Positive collaboration efforts allow for more comprehensive care for difficult emotional and psychosomatic problems (McDaniel, 1995). Both physicians and psychologists have a service-oriented approach to working with children. Witmer (1896) was one of the first to recognize the complementary nature of the two professions. He noted that both work with other professionals to enhance children's health, support their development, and broadly promote society's welfare (Witmer, 1896).

Both physicians and psychologists are interested in the needs of the children they serve (McDaniel, 1995). While physicians advocate as agents of the health system, psychologists serve as agents of the educational system (Wodrich, 2004). Although physicians and psychologists are trained differently, are subjected to different legal mandates, and are supported from different financial resources (Chung, Shaw, & Meltzer, 2003; Fagan, 2003), comparisons between these dimensions are striking. For instance, each has an advanced degree, completes in-vivo training requirements (i.e., internships and residencies), requires advanced credentialing, and may work in settings that are funded through government sources.

At times, however, psychologists may find themselves in an adversarial relationship with physicians. For example, a physician may receive notes from personnel demanding that they prescribe medication for a child. This assertion may make a physician view educators as practicing medicine without a license or providing

information irrelevant to the child's medical issues (Shaw, Clayton, Dodd, & Rigby, 2009). Conversely, physicians might demand that the school provide special education or therapeutic services, which may be viewed by the educators as disrespectful of school policies or ignorant of school law and regulation (Shaw, Clayton, Dodd, & Rigby, 2009).

The benefits of collaboration can be rich for both professions, far outweighing the drawbacks. The physician is able to educate the psychologist about the cause, projected course, and prognosis of the illness or disease (McDaniel, 1995). The physician also is able to prescribe medication to treat the child's medical needs, whereas psychologists do not have the authority to prescribe medication. In return, psychologists can model effective problem-solving skills and relationship cultivation skills for the physician. School psychologists can offer a physician the perspective on various aspects of the child's education. In addition, psychologists offer the physician particular attention to the psychosocial levels of a problem, since it is difficult for one person to attend to all relevant domains (Bloch, 1988). Through collaboration, physicians prevent "psychosocial fixation" (McDaniel, Campbell, & Seaburn, 1990) for the psychologist and psychologists prevent "somatic fixation" for the physician (Huygen, 1981).

### **Osteopathic Medicine**

Osteopathic medicine was founded in 1874 in Kirksville, Missouri (American Association of Colleges of Osteopathic Medicine [AACOM], 2012), by Andrew Taylor Still, MD, a physician trained in allopathic medicine. Dissatisfied with the effectiveness of 19<sup>th</sup> century medicine, he studied the attributes of good health to better understand disease. As a primary focus of his research, he focused on the unity of all body parts and placed particular emphasis on the musculoskeletal system as being instrumental to health.

Based on a thorough understanding of the body's correlated systems, Dr. Still introduced the idea of returning the body to health.

Osteopathic medicine involves a comprehensive and holistic (mind-body-spirit) approach to health care, with an emphasis that physicians work in partnership with patients for optimal outcomes. This approach to health care involves treating the whole person and not just the symptoms. Osteopathic physicians use all of the tools available through modern medicine including prescription medicine and surgery; however, they also incorporate osteopathic manipulative medicine into their regimen of patient care, when appropriate (AACOM, 2012). Osteopathic manipulative medicine aids the body's natural healing process through use of a set of manual medicine techniques that are used to diagnose illness and injury, relieve pain, restore range of motion, and enhance the body's capacity to heal (AACOM, 2012). Osteopathic physicians regard palpation, or diagnostic touch, as one of the distinct tenets of osteopathic medicine (Degenhardt, 2000).

Like their allopathic counterparts, physicians licensed as Doctors of Osteopathic Medicine (DOs) must pass a national state medical board examination in order to obtain a license to practice medicine. The AACOM describes present trends in osteopathic medicine as follows:

Currently, there are more than 50,000 DOs practicing in the United States.

Reflecting the osteopathic philosophy of treating the whole person, many DOs serve in the primary care areas of family medicine, general internal medicine, and pediatrics, often establishing their practices in medically underserved areas. But many others are found in a wide range of medical specialties including surgery,

anesthesiology, sports medicine, geriatrics, and emergency medicine. Still others serve as health care policy leaders at the local, state, and national levels. In addition, an increasing emphasis on biomedical research at several of the osteopathic colleges has expanded opportunities for DOs interested in pursuing careers in medical research (1).

### **Doctor of Osteopathic Medicine Training at Philadelphia College of Osteopathic Medicine**

Philadelphia College of Osteopathic Medicine (PCOM) offers a wide range of programming at the graduate level. The college's primary focus has been on training DOs, but in the past several decades, graduate programs from other disciplines have evolved to permanent program offerings. In addition to the DO program, physicians-in-training can combine their skills and interests with other disciplines through several dual degree offerings, which include DO/Master of Business Administration (MBA); DO/Master of Public Health (M.P.H.); DO/MS/PhD in Health Policy; DO/MS in Forensic Medicine; and DO/MSc. (Clinical Masters). The college also offers graduate programs in other disciplines, which include Biomedical Sciences (MS), Physician Assistant Studies (MS), Forensic Medicine (MS/Pathway), Clinical Psychology (PsyD, Post-Doctoral), Counseling and Clinical Health Psychology (MS, CAGS), School Psychology (PsyD, EdS, MS), Organizational Development & Leadership (MS), and postgraduate medical research opportunities.

The osteopathic curriculum at PCOM involves 4 years of academic study. The course work emphasizes preventative patient care. After completion of the course work, DOs serve a 1-year internship, gaining experience in family medicine, gynecology,



pediatrics, and surgery. After the internship year, many DOs then complete a residency program for an additional 2 to 6 years of training.

PCOM instructors adhere to a “Doctors from Day One” philosophy of student training, which emphasizes practicing medicine within an interpersonal context with the patient. PCOM students are strongly encouraged to gain insight into their patients’ health needs by looking beyond just the patient in front of them and focusing on the social and economic factors that impact the patient. According to PCOM’s online student handbook on their website ([www.pcom.edu](http://www.pcom.edu), 2012):

First- and second-year students see how their academic work and problem-solving principles apply to clinical practice through interaction with family physicians. This part of your education introduces you to a life-long learning process of becoming a well-trained and caring physician. You will practice clinical skills with "patient-actors" in the innovative "Standardized Patient Program." In a suite of exam rooms and offices called the Clinical Learning and Assessment Center, you will learn how to present yourself to patients and how to improve diagnostic and communication skills. Professional actors assume the roles of patients with specific medical histories. As a student, you interview the "patient," develop a history and physical examination profile and suggest a diagnosis. Each session is videotaped, and student performance is evaluated by a faculty member and reviewed with the student.

### ***Integrated Curriculum***

“The primary patient care skills are complemented by our integrated approach to biomedical knowledge that introduces both basic and clinical sciences in your first two years. By learning these subjects in tandem, rather than one followed by the other, the abstraction of science becomes tangible by its application in

practice. The study of anatomy and physiology, for example, is paired with learning the principles of physical examination and osteopathic manipulative medicine (OMM).

We use a variety of methods to present this information: problem-oriented cases, lectures, laboratory study, small group conferences, student-centered study and projects, medical informatics instruction and selected symposia. Even though we are a large medical school, we provide plenty of opportunity for one-on-one interaction between students and teachers.

Since medicine is practiced within a social context, the curriculum includes humanities-oriented programs, such as medical ethics, human sexuality, medical law and medical economics. Every doctor must address these topics, which broaden your understanding of changing attitudes and contemporary health care issues.”

### ***Hands-on Medicine at PCOM's Pennsylvania Healthcare Centers***

“All students spend four months in PCOM's Community Healthcare Centers, which provide health care to medically underserved communities. You will spend two months in our rural center and two months in an inner-city center. At these sites you will be introduced to the realities of patient care in underserved communities.

In your third and fourth years, you will be exposed to a broad scope of medical problems, gradually assuming more responsibility under the direction of experienced physicians. Through participation in rounds, lectures, conferences, morning reports and case presentations, you develop skills in history-taking, physical examination, differential diagnosis, and invasive and non-invasive procedures. While some clerkships are assigned and required, students may elect to pursue special interests at other institutions in Philadelphia or elsewhere. Some students have chosen studies in India, Israel, Africa, Appalachia and Indian Health Service sites in the United States. One student completed an aerospace medicine clerkship program as an elective rotation. Others have pursued special interests through competitive fellowships and research.”

### **Autoimmune Disease**

The fact that living organisms continue to exist is testimony to the power of the general effectiveness of the immune system. The human immune system is comprised of biological structures and processes that protect the body against disease. The main organs of the immune system include the bone marrow, thymus gland, spleen, adenoids, tonsils,

and lymph nodes. The immune system is also composed of highly specialized cells that have an important role in upholding the healthy functioning of normal immune processes. These include T-cells, B-cells, natural killer cells, granulocytes, macrophages, and dendritic cells (Alberts, Johnson, Lewis, Raff, Roberts, & Walter, 2002).

In healthy immune system functioning, when an invading, infected, or abnormal cell is detected, the cell-mediated systems work together in a highly systematic way to attack and destroy the foreign pathogen. The immune system is comprised of a layered defense system of increasing specificity, including the innate immune system and the adaptive immune system (Mayer, 2006). The innate immune system is the first layer of defense. If pathogens invade the innate response, a second layer of protection, the adaptive immune system, is activated. If this system is successfully able to eliminate the threat to the immune system, an immunological memory for that particular foreign threat is formed, which allows the immune response to attack it quicker the next time it is encountered (Mayer, 2006).

As much as the immune system is a friend, it can also be a foe. For reasons still being investigated in their entirety, when an individual's immune system encounters a foreign pathogen, normal system processes can go awry. Through the process of molecular mimicry, antibodies that are formed against an infectious agent can recognize healthy cells in error and begin to systematically destroy the healthy cells. This process of healthy cell degradation is referred to as an autoimmune response.

Autoimmune diseases are a clinically diverse group of diseases caused by inappropriate or hyperactive immune responses against tissues and substances normally considered "self" (Hu & Daly, 2012). More than 80 different autoimmune disorders

affect more than 24 million people in the United States, although that fact could be triple that number, as many are undiagnosed (Patrick, 2009). Non-organ specific autoimmune disorders include systemic lupus erythematosus, ankylosing spondylitis and rheumatoid arthritis. Type 1 diabetes, Graves' disease, myasthenia gravis, and Crohn's disease are organ specific (Harris, 2011). When autoimmune responses occur in the brain, a host of potential neuropsychiatric symptoms can ensue (Swedo & Grant, 2005).

Autoimmune disease of the CNS has long been suspected to have the underpinnings of infectious causes. Dr. Laurence Selling reported one of the earliest correlations between the onset of tics and infectious disease in 1929 (Selling, 1929). The first infectious agent shown to cause a post-infectious autoimmune disorder in the CNS was *Streptococcus pyogenes* in Sydenham chorea, the neuropsychiatric manifestation of rheumatic fever (Snider & Swedo, 2003). Allen, Leonard, and Swedo (1995) published the earliest description of a newly recognized clinical phenomenon in which tics and OCD seemed to be provoked by a preceding streptococcal infection (as cited in Swedo & Grant, 2005).

### **Historical Background of PANDAS**

Interest in pediatric autoimmune neuropsychiatric disorders was piqued when researchers at the National Institute of Mental Health (NIMH) were conducting parallel studies of childhood-onset OCD and Sydenham chorea in the early 1990s. Sydenham chorea is a neurological disorder of childhood, long suspected to have an autoimmune origin, characterized by rapid, irregular, and involuntary movements of the arms, legs, trunk, and facial muscles and may also include uncoordinated movements, muscular weakness, stumbling and falling, slurred speech, difficulty concentrating and writing, and

emotional instability (Pavone, Parano, Rizzo, & Trifiletti, 2006). The level of symptom severity can vary from slight to incapacitating.

The NIMH researchers observed that some of the children had an unusually abrupt onset of symptoms, without chorea, followed by vacillating cycles of symptom dormancy and exacerbation. Upon closer investigation, the NIMH investigators discovered that the course of symptoms expressed in the children studied usually occurred in response to the presence of a viral or bacterial infection. This discovery led Swedo and colleagues to suggest a relationship between pediatric autoimmune neuropsychiatric disorders and group A beta-hemolytic streptococcal (GABHS) infection. An important distinction to make is that the symptoms are not caused by the strep infection itself, but by the body's reaction to the infection (Swedo & Grant, 2005).

Children presenting with this waxing and waning course may have been given primary diagnoses of OCD, tic disorders, or Tourette syndrome prior to the commencement of these studies. Typically, hallmark symptoms of OCD (obsessive thoughts, compulsive behaviors, motor and vocal tics) begin gradually, not abruptly, and are not always consistently visible. The first patient to be examined in greater detail was a 10-year old boy who presented with a 2-week history of severe obsessive concerns about contamination from AIDS and other germs, cleaning and hoarding rituals, a nearly constant spitting tic, and choreiform movements (Swedo et al., 1998). His symptoms had seemed to occur "overnight" and had progressed so rapidly over a 48-hour period, he was unable to go to school or participate in extracurricular activities. Upon a review of his medical history, his mother noted that he had presently been ill with a Group A Beta-

Hemolytic Streptococcal (GABHS) pharyngitis, suggesting a possible link to the symptom exacerbation.

To confirm the presence of this particular pathogen in his system, an antistreptococcal antibody titer and an antineuronal antibody titer were analyzed. His antistreptococcal antibody titer was markedly elevated and his antineuronal antibody titers were positive, confirming the presence of GABHS in his system. Over the next few weeks, the severity of his symptoms gradually decreased to a subclinical level, and he was seronegative. After an 8-month period of symptom dormancy, he experienced another cycle of abrupt symptomatology. His titers were again indicative of a GABHS infection. This pattern of symptom fluctuation was ongoing over the course of the following 2 years of observation.

Two primary classifications of pediatric autoimmune neuropsychiatric disorders describe the same episodic course of neuropsychiatric symptoms. The term *Pediatric Infection Triggered Autoimmune Neuropsychiatric Disorders (PITAND)* was used to classify neurological and behavioral disorders that had no clear mechanism for their etiology or pathogenesis. PANDAS is used to define cases related to a known strep infection. A recent classification, Pediatric Acute-onset Neuropsychiatric Syndromes (PANS), has been established by the NIMH as a possibility when strep cannot be directly linked to the onset of symptoms (Swedo, Leckman, & Rose, 2012). This classification replaces PITAND and includes a variety of infections found to be related to the onset of neuropsychiatric symptoms, including influenza, Lyme disease, and Mycoplasma pneumonia.

## **Diagnosis and Symptoms of PANDAS**

PANDAS is a clinical diagnosis, relying less on laboratory results and more on a carefully taken history and physical examination. The Yale Brown Obsessive-Compulsive Scale and a Yale Global Tic Severity Scale are used to make a determination of criterion eligibility. Diagnosing PANDAS can be delayed because of the unfamiliarity of the diagnosis within the general medical community. It can also be delayed because other immune system diseases, such as Lyme disease, celiac disease, lupus, Kawasaki disease, acute rheumatic fever, and others can also cause OCD to appear suddenly (Stewart & Murphy, 2010). Typically, a rapid and/or culture throat swab to test for strep is done if an infection is suspected. If the throat swab does not show any signs of strep, a blood test for an antibody called Anti-Streptolysin O can also be done (Stewart & Murphy, 2010).

Anti-basal ganglia auto-antibodies are potential indicators in the argument for support for PANDAS. The lack of standardized diagnostic methodology makes the comparison and generalization of research findings difficult. Mell, Davis and Owens (2005) reported epidemiologic evidence for PANDAS induced by childhood streptococcal infection in their case-control sample of children 4 to 13 years old who were first diagnosed with OCD, Tourette syndrome, or tic disorder. Contradictory research supports that streptococcal infection is an unlikely specific risk factor for the development or phenotypic expression of Tourette syndrome overall (Phelps, 2008).

In 2012, the NIMH revised the criteria and guidelines for PANDAS. The criteria used to diagnose PANDAS are as follows:

- Presence of clinically significant obsessions, compulsions and/or tics
- Unusually abrupt onset of symptoms or a relapsing-remitting course of symptom severity
- Prepubertal onset
- Association with other neuropsychiatric symptoms
- Association with streptococcal infection

The diagnostic criteria for PANS are as follows (2012):

- Abrupt, dramatic onset of obsessive-compulsive disorder and/or Tic Disorder
- Concurrent presence of additional neuropsychiatric symptoms, with similarly severe and acute onset, from at least two of the following seven categories (Anxiety; Emotional lability and/or depression; Irritability, aggression and/or severely oppositional behaviors; Behavioral regression; Deterioration in school performance; Sensory abnormalities; and Somatic signs and symptoms, including sleep disturbances, bedwetting or urinary frequency)
- Prepubertal Onset
- Acute onset and episodic course (Onset is overnight and sudden; Exacerbations are sudden, & Symptoms are relapsing and remitting, not waxing and waning)
- Symptoms are not better explained by a known neurologic or medical disorder, such as Sydenham chorea, systemic lupus erythematosus, Tourette disorder, or others



In addition to the specific diagnostic criteria just outlined, it is important to distinguish the secondary characteristic features that set PANDAS and PANS apart from other infections. Symptom presentation is always acute, not chronic, although the prolonged course of relapsing and remitting symptom presentation may give the illusion that PANDAS and PANS are chronic illnesses. Also, the variability in the type of symptoms displayed by individual children is significant. For example, symptoms of OCD may be manifested as anorexia. Lastly, symptom profiles for childhood cases may change over time, “with one set of symptoms predominating at onset and others becoming problematic after a period of weeks” (Swedo et al., 2012, p. 4).

### **Subcortical Structures and the Basal Ganglia**

The basal ganglia region of the brain is hypothesized to be the seat of autoimmune vulnerability for acute-onset autoimmune neuropsychiatric disorders. The basal ganglia are a collection of nuclei of varied origin located deep within the white matter of the brain at the base of the forebrain. They have been implicated in a diverse array of motor, cognitive, and affective symptoms (Koziol & Ely-Budding, 2009) that accompany known neurologic conditions resulting from abnormal functioning of the basal ganglia, including Parkinson’s disease, Huntington’s disease, dystonia, Tourette syndrome, and OCD (Utter & Basso, 2008).

In particular, structural and functional neuroimaging studies demonstrate the involvement of pathways leading from cortex through basal ganglia to thalamus in OCD (Leckman, 2002). Giedd, Rapoport, Garvey, Perlmutter, and Swedo (2000) found the average sizes of the caudate, putamen, and globus pallidus, not the thalamus or total

cerebrum, were significantly greater in MRI assessment of children with OCD or tics associated with streptococcal infection. The basal ganglia have been viewed as being an integral part of the motor system (Mendoza & Foundas, 2010). A primary function of the basal ganglia is the facilitation of the ability to switch effectively between motor and mental behaviors required for producing novel behavior, with failure resulting in the repetitive production of stereotyped movements, thoughts, or behaviors as in tic disorders or OCD (Hoekstra & Minderaa, 2005).

Four predominant structures encompass the basal ganglia - the striatum, the pallidum, the substantia nigra, and the subthalamic nucleus (Koziol & Ely Budding, 2009). MRI scans reveal enlargements of this area, which points to inflammatory changes, while local autoimmune reactions are suggested by the presence of serum antibodies that cross-react with neurons of the caudate, putamen, and globus pallidus (Swedo, 2002). The striatum, the pallidum, and the substantia nigra contain important subdivisions. The striatum is the largest of the four structures. It receives sensory input from other areas of the brain, and it serves as a gateway to all sensory input into the basal ganglia. Two primary subdivisions of the striatum are the dorsal striatum, which consists of the caudate nucleus and the putamen, and the ventral striatum, which includes the nucleus accumbens, the septum, and the olfactory tubercle.

The pallidum includes three subdivisions- the ventral pallidum, the internal segment of the globus pallidus, and the external segment of the globus pallidus. Considered an intermediate structure, the external segment of the globus pallidus sends projections to other regions within the basal ganglia, thereby tempering output. The ventral pallidum and internal segment of the globus pallidus are output structures (Koziol

& Ely Budding, 2009). The medial or internal segment's main output is to the thalamus, while the output of the external segment is directed primarily to the substantia nigra and subthalamic nuclei (Mendoza & Foundas, 2010).

The substantia nigra contains two substructures: the substantia nigra pars compacta and the substantia nigra pars reticularis. The substantia nigra pars compacta is an important source of dopamine synthesis. Disruption at this site can lead to decreased motor activity. The substantia nigra pars reticularis has been implemented as an important structure for the control of ocular movements.

The subthalamus contains several distinct nuclear groups, including the subthalamic nucleus. Input to the subthalamus is received from the sensorimotor regions of the cortex, from the centromedian and parafascicular nuclei of the thalamus, from the pars compacta of the substantia nigra, and from the pedunculopontine nucleus in the brainstem (Mendoza & Foundas, 2010). The subthalamic fibers of this region are GABAergic on a neurochemical level and have an inhibitory effect. The efferent fibers of the subthalamus are neurochemically glutaminergic and possess an excitatory effect.

The basal ganglia have been implicated in five corticostriatocortical pathways or loops (Alexander, DeLong, & Strick, 1986). The pathways include the motor circuit, the oculomotor circuit, the dorsolateral circuit, the lateral orbitofrontal circuit, and the limbic circuit. The motor circuit is thought to originate from cortical neurons in the primary and supplementary motor, primary somatosensory, and possibly adjacent association cortices (Mendoza & Foundas, 2010). The motor circuit contains both direct and indirect routes to the thalamus.

The oculomotor circuit is implemented in controlling eye movements and in conducting visual scans of the environment. The dorsolateral circuit stems from the dorsolateral frontal association cortices and continues on a pathway to the thalamus before ending up back in the dorsolateral association cortices. This loop is hypothesized to play a vital role in the higher cognitive, executive-function capacity. The lateral orbital frontal circuit is implemented in mediating basic emotional drives such, as those involved in instincts or learned environmental contingencies. OCDs have been associated with this area and are thought to originate from increased metabolism in this circuit.

The limbic circuit primarily includes the anterior cingulate gyrus, medial orbitofrontal areas, and hippocampal gyrus. OCD and select features of schizophrenia have been linked to this region of the brain. Ballantine (1986) reported that selective lesions to the anterior cingulate gyrus have been beneficial in relieving OCD symptoms. The basal ganglia circuitry leads to the frontal regions of the brain, suggesting that these select circuits are essential to modulate behavioral control. In a study by Hirschtritt et al. (2009), children and adolescents (ages 5 to 16 years) diagnosed with PANDAS were compared to a group of 98 healthy volunteers, and a paired comparison of the two groups showed that the subjects with PANDAS were less accurate than the group of healthy children in a test of response suppression.

Dysfunction in the caudate nucleus is thought to disrupt signals traveling along the orbitofrontal-striatal pathways. The caudate is a midline subcortical structure consisting of two “C”-shaped structures. The orbitofrontal circuit (OFC) has two divisions – the lateral and the medial divisions- which can be thought of as separate circuitries. A disturbance of the orbitofrontal-subcortical circuitry can easily occur within

the spectrum of developmental disorders, such as OCD and attention deficit disorder, which are developmental disorders of the frontostriatal system (Bradshaw, 2001).

The skeletomotor circuitries are implemented in classic symptoms of movement disorders. Studies of patients with hypokinetic and hyperkinetic movement disorders reveal important details about the functions of the basal ganglia. At the cortical level, disturbances are manifested by deficits in motor programming, while intentionality is related to cortical-subcortical circuitry (Koziol & Ely-Budding, 2009).

### **Pediatric-Onset OCD and Tics**

*The Diagnostic and Statistical Manual of Mental Disorders*, 4<sup>th</sup> ed., text rev.; *DSM-IV-TR*; American Psychiatric Association, 2000) identifies the hallmark features of Obsessive-Compulsive Disorder as recurrent obsessions or compulsions that are severe enough to be time consuming or to cause marked distress or significant impairment. Obsessions involve involuntary intrusive thoughts, impulses, or images that cause intense anxiety or distress for the individual. Compulsions are repetitive behaviors or mental acts that are generally employed by the individual to ameliorate the intense anxiety that accompanies the obsessive behaviors. For example, obsessive behavior could include an intense fear of germ contamination, and the compulsion is the repeated hand washing that follows. Unfortunately, the relief is usually only temporary. Obsessions and compulsions can displace useful behavior and can be highly disruptive to an individual's overall functioning (American Psychiatric Association, 2000).

The first pediatric OCD case was described in 1903 (Janet, 1903). OCD and related conditions, including Tourette syndrome, affect as many as 1-3% of the pediatric population (Kalra & Swedo, 2009; Khalifa & von Knorring, 2003). Tic disorders are the

most common movement disorders diagnosed in children (Behrman, Kliegman, & Jenson, 2000), with an estimated 5-20% of school children experiencing a simple or complex motor or vocal tic during their lifetime (Shapiro, Young, & Feinberg, 1988). Common compulsions in children include washing, checking, and ordering rituals (Kalra & Swedo, 2009). Leckman and colleagues have identified four phenomenological subtypes of childhood-onset OCD based on the child's symptoms: obsessions and checking; symmetry and ordering; cleanliness and washing; and hoarding (Leckman et al., 1997).

The etiologies of these disorders remain unknown, but over the past several years, increasing evidence has pointed to immune-related causation in some cases of childhood-onset OCD, tic disorders, and other anxiety disorders, such as separation anxiety (Murphy, Kurlan, & Leckman, 2010). For a small subset of the children, Obsessive-Compulsive Disorder may be associated with GABHS infection (American Psychiatric Association, 2000). These children may have a genetic predisposition, with rates of OCD and tic disorders in first-degree relatives of pediatric probands with PANDAS seeming higher than those reported in the general population (Lougee, Perlmutter, Nicolson, Garvey, & Swedo, 2000).

A minority of people suffering from OCD remain refractory to all standard pharmacological and psychological treatments (The British Psychological Society & The Royal College of Psychiatrists, 2006). Individuals who suffer with the PANDAS subtype of OCD rarely achieve satisfactory outcomes, often experiencing a "sawtooth" clinical course (Swedo et al., 1998), with even poorer outcomes associated with those who have an onset before age 20 years (Skoog & Skoog, 1999).

### **Current Medical Treatments for PANDAS**

The lack of general awareness in the medical community for considering PANDAS, PITAND, or PANS as a primary diagnosis has made treating this disorder even more controversial. The strep infection is usually treated with a course of antibiotics. Corticosteroids have been used to treat patients with Sydenham chorea with severe symptoms, but this treatment has not always been effective, and relapses are frequent after cessation (Garvey, Snider, Leitman, Werden, & Swedo, 2005). Research has also been mixed about the long-term effects of using immunomodulatory therapies, such as prednisone, intravenous immunoglobulin, and plasma exchange.

Selective serotonin reuptake inhibitors (SSRIs) need to be used with caution since children with PANDAS are more susceptible to the associated behavioral side effects (aggression, hyperactivity, sleep problems, and even suicidal thinking) associated with this class of medications (Stewart & Murphy, 2010). Prolonged antibiotic use has gained popularity but is used with extreme caution since lengthy drug courses can lead to the breakdown of the body's ability to regulate healthy bacteria. Cognitive-behavioral therapy is often used to treat the obsessions, compulsions, and anxiety-related symptoms associated with the OCD features of acute-onset autoimmune neuropsychiatric disorders.

### **PANDAS/PANS in the School Setting**

Children with acute-onset autoimmune neuropsychiatric disorders present with a unique set of challenges in the school setting. Children with these particular disorders experience an abrupt onset of symptoms that may include anxiety, hyperactivity, attention deficits, motor and vocal tics, obsessive-compulsive behaviors, handwriting difficulty only during symptom exacerbation, and mathematics difficulty that impact their

ability to participate in the general education curriculum in a variety of ways (O'Rourke, 2003). Symptoms can vary, disappear, or reappear when a child is in exacerbation or after medical treatment (Tona & Posner, 2011). Parental and school awareness of the syndrome, its causes, and potential interventions are critical to a child's success in school.

Children with pediatric acute-onset neuropsychiatric syndromes exhibit a temporal relationship between symptom exacerbation and neurological abnormalities. Given the relapsing and remitting pattern of symptom presentation, justifying special-education support, as outlined in IDEA (2004), is difficult. Children with autoimmune disorders may qualify for special-education and related services under the OHI category, but to qualify a child for the disability categories established under IDEA, including OHI, the disability must adversely affect his or her educational performance and create a need for special education services (Grice, 2002).

If an educational team does not feel special education is appropriate for students with autoimmune susceptibility because of the inconsistency of the need for educational management, a second option is available for educational teams to consider. Under Section 504 of the Rehabilitation Act of 1973, individuals with disabilities are defined as:

persons with a physical or mental impairment which substantially limits one or more major life activities. People who have a history of, or who are regarded as having a physical or mental impairment that substantially limits one or more major life activities, are also covered. Major life activities include caring for one's self, walking, seeing, hearing, speaking, breathing, working, performing manual tasks, and learning.



If children with autoimmune susceptibility do receive accommodations and modifications, they are often given in regular education settings. However, unless their condition is considered severe, these children may not receive the academic and psychosocial support they need at school.

School psychologists are “generalists,” expected to know a “little of everything.” According to Volume 2 of the National Association of School Psychologist’s *Best Practices in School Psychology V*: “School psychologists should be good problem solvers who collect information that aids in understanding problems, making decisions about appropriate interventions, assessing educational outcomes, and making accountability decisions (2008).” The body of school psychology knowledge has grown exponentially in the past several years (Miller, 2010). In response to this growth, Fagan (2002) indicated “that the point has been exceeded where a school psychologist can be trained to perform all roles and functions with competence” (p.7). In response, pediatric school psychology has become an emerging specialization.

### ***Research Questions***

Question 1: What are the demographic characteristics of surveyed PCOM medical students?

Question 2: What is the general level of awareness of PANDAS among PCOM medical students?

- a) What percentage of the PCOM medical students surveyed agreed that the child in the hypothetical PANDAS vignette would benefit from integrated healthcare collaboration between the physician and the school psychologist?

- b) What are the alternative preliminary diagnoses reported by survey participants in response to the vignette?
- c) What percentage of medical students have worked with a suspected or confirmed case of PANDAS?
- d) Based on their medical training, what percentage of surveyed medical students reported feeling prepared to identify a suspected case of PANDAS?
- e) What would be important for a physician to use to diagnose PANDAS?
- f) What treatment would DO students recommend if they suspected PANDAS?

Question 3: What is the average level of agreement that PCOM medical students report for each of the associated medical and neuropsychological impairments?

Question 4: How do PCOM medical students respond to questions regarding integrated health care collaboration between a physician and school psychologist?

- a) How do the cohorts of PCOM medical students differ in their reporting that they have received training in interdisciplinary collaboration while a student at PCOM?
- b) What percentage of PCOM medical students would be interested in receiving more specialized training in how to participate in integrated health care collaboration with school psychologists?
- c) What percentage of PCOM medical students would be interested in providing consultation to a school-based multidisciplinary team in the future?

Question 5: What does a working model of integrated health care collaboration look like from the perspective of PCOM medical students?

- a) What is the most preferred mode of contact?
- b) What is the biggest barrier to effective interdisciplinary health care collaboration?
- c) What are the most important assets for a school psychologist to possess?

***Research Hypotheses***

- 1) By their fourth year of medical training, at least 75% of the surveyed 4<sup>th</sup> year PCOM medical students will report that they feel prepared to identify a suspected case of PANDAS based on their medical training at PCOM.
- 2) By their fourth year of medical training, at least 75% of the surveyed 4<sup>th</sup> year PCOM medical students will report that they had specific training related to integrated healthcare collaboration while a student at PCOM.

## Chapter Three

### Methods

#### *Participants*

Participants in this study included medical students at both the Philadelphia and Georgia campuses of the Philadelphia College of Osteopathic Medicine (PCOM) who volunteered to participate and who completed a survey titled, *Pediatric Autoimmune Survey* (see Appendix A). According to the Registrar at PCOM, 1,091 medical students at the Philadelphia Campus and 435 medical students at the Georgia Campus were eligible to participate in this survey at the time of data collection. A total of 276 of the eligible medical students (18%) answered the first question of the survey, *Are you a 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, or 4<sup>th</sup> year medical student at Philadelphia College of Osteopathic Medicine* (Yes:  $n = 275$ ; No:  $n = 1$ ); however, the response rate varied for each question, with only 48 - 64% ( $n$  range = 160 - 173) of the 276 DO students actually responding to each of the subsequent survey questions. As shown in Table 1 in Chapter 4, participants who completed the survey included both male and female participants who were of varying ethnicities. Of the 172 respondents who reported their year of training cohort, 26.2% ( $n = 45$ ) reported being students of the 1<sup>st</sup> year cohort, 21.5% ( $n = 37$ ) reported being students of the 2<sup>nd</sup> year cohort, 23.8% ( $n = 41$ ) reported being students of the 3<sup>rd</sup> year cohort, and 28.5% ( $n = 49$ ) reported being students of the 4<sup>th</sup> year cohort (see Table 2 in Chapter 4).

The majority of the student participants taking this survey were not from a dual-degree DO program ( $n = 167$ , 96.5%); however, six participants were from dual-degree programs (DO/MBA  $n = 1$ , 0.6%; DO/MPH  $n = 2$ , 1.2%; and DO/MS Forensic Medicine  $n = 3$ , 1.7%). Of the respondents to the survey, 173 students reported either their intended

specialization ( $n = 164$ ) or being undecided ( $n = 9$ ) about a particular specialization at the time of data collection, as shown in Table 3 in Chapter 4. Survey participants were also from 27 different states (see Table 4 in Chapter 4).

### ***Measures***

The sole instrument for this study was a survey, titled *Pediatric Autoimmune Survey* (see Appendix A). This survey was developed by the author and designed to explore PCOM medical students' awareness of PANDAS; to assess their self-reported level of agreement in the value of providing integrated health care consultation to school psychologists on associated medical and psychological impairments; and to determine important considerations for the pediatric school psychologist to consider in order to maximize opportunity for successful integrated health care consultation, as seen by the PCOM DO student. A survey design provides a quantitative or numeric description of some fraction of the population - the sample – by asking questions of people (Creswell, 1994). The several modes of survey administration include face-to-face, telephone, mail, and web-based, which was the chosen mode for administration of this survey.

In order to ensure that the survey was appropriate for answering the research questions of interest to the surveyor, the dissertation committee, consisting of two faculty members at PCOM and a doctoral-level school psychologist, read the survey to ensure face validity. The survey was also reviewed by an additional faculty member at PCOM with expertise in quantitative research design to ensure face validity. The resulting survey questionnaire contained questions of a mixed-methods format, including Yes/No format, a 5-point Likert-scale format, choices from a closed-response set, and open-ended questions. Two preliminary inclusion questions were asked of potential participants at the

beginning of the survey. The first question was, *Are you a 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, or 4<sup>th</sup> year medical student at Philadelphia College of Osteopathic Medicine?* The second question was, *Do you attend one of these programs: DO, DO/MBA Dual Degree, DO/MPH Dual Degree, DO/PhD in Health Policy Dual Degree, or DO/MS in Forensic Medicine Degree?*

Potential participants were then told that if they responded “No” to either of those questions, they were not eligible to participate in the survey, but were thanked for their time and consideration.

The survey was divided into four sections: Section 1, *PCOM medical students’ awareness of PANDAS*; Section 2, *PCOM medical students’ level of agreement regarding the value of integrated health care collaboration for associated medical and psychological impairments*; Section 3, *Important considerations for successful integrated health care collaboration*; and 4, *Demographics*. The first section of the survey included seven questions to assess the participants’ awareness of PANDAS/PANS and a vignette about a child with a suspected case of PANDAS/PANS. Participants were asked to read the vignette and then offer their diagnostic impression(s) using an open-ended format. The rest of the questions were a mixture of Likert-scale format, Yes/No, and item selection questions.

The second section of the survey used a 5-point Likert-scale format to measure participants’ level of agreement regarding their perceived value of a physician and a school psychologist engaging in integrated health care collaboration for associated physical, emotional, and behavioral symptoms of PANDAS, although these symptoms generally exist independent of PANDAS and could prompt the need for integrated health care collaboration. As such, under the guise of PANDAS, the physical, emotional, and

behavioral symptoms that secured the highest level of agreement can be useful knowledge in determining medical students' views regarding how helpful interdisciplinary collaboration can be for symptoms outside the scope of their training.

The third section of the survey contained five personal-preference-type questions that were designed to offer considerations to the school psychologist in terms of preferred methods of communication and barriers to effective interdisciplinary consultation, as determined by the participants. Responses were given in the form of Likert-scale and hierarchical rating format. The final section of the survey asked basic demographic information of participants. The final set of three questions in this section assessed participants' personal affiliation with school psychologists.

### ***Procedures***

As indicated previously, upon completion of the drafted survey, the dissertation committee, consisting of two PCOM faculty members and an individual with a doctoral degree who is not directly affiliated with the Department of Psychology at PCOM, reviewed the survey to ensure face validity. Upon approval, the survey was presented to the Institutional Review Board (IRB) for approval. Upon approval from the IRB, the survey was sent electronically to the Vice President for Graduate Programs and Planning at PCOM. This individual agreed to post the survey onto Survey Monkey © ([www.surveymonkey.com](http://www.surveymonkey.com)), which is an online fee-for-service survey company. This individual also agreed to embed the survey information into Gmail and to disseminate the direct survey email link electronically to all eligible DO students from both campuses. Accompanying the survey was an introduction to the survey, a statement of the purpose of the study, and a statement about the approximate time frame needed to complete the

survey (15 minutes). A cover letter (Appendix B), which also accompanied the survey request, included a statement informing participants that (a) participation in the survey was strictly voluntary, (b) participants inherently granted consent to participate in the survey by completing and returning the survey, (c) responses were confidential, and (d) no personally identifiable information would be obtained to identify participants individually. Participants also received the contact information for the principal investigator and an invitation to contact the principal investigator with questions, concerns, or requests for further information. An initial invitation was sent electronically to all eligible medical students (Appendix C). A reminder email (Appendix D) went out to all eligible participants 2 weeks after the initial survey release date.

Eligible participants were also invited to voluntarily enter a gift card drawing. They were informed that their responses to the survey questions were anonymous and that the email addresses provided would not be associated with their responses to the survey. A total of 133 individuals responded to the gift card drawing via survey response. Five students contacted the responsible investigator via email to ask that their email addresses be included in the drawing, indicating that they had not seen the place to put their email address on the survey. Unfortunately, there was no way to validate survey participation, as all survey responses were anonymous; therefore, their email addresses were added to the list in good faith.

A total of 276 potential participants logged on to the survey and responded to the first and second inclusionary/exclusionary questions. A total of 275 potential participants matched inclusion criteria for being a medical school student; one person did not. A total of 267 potential participants reported that they attended one of the required programs;



however, nine reported that they did not. The response rate per question dropped to between 48 and 63% of the 276 students, suggesting only partial response endorsement from approximately half of all eligible participants who logged on to take the survey. After 4 weeks from the initial date of survey distribution, the survey results were collected, analyzed, and reported in response to the research questions.

### *Analysis*

Once the survey data were collected from the completed surveys, the data were downloaded into a Microsoft Excel spreadsheet and into the program, Statistical Package for the Social Sciences (SPSS), Version 18. The data were then analyzed using the Crosstabulation option in SPSS to generate meaningful description analyses as well as Pearson chi-square correlations. Other inferential statistics were considered, but decided against because of small sample sizes for some of the questions.

## Chapter Four

### Results

***Question 1: What are the demographic characteristics of surveyed PCOM medical students?***

All medical students in years 1 through 4 of the Doctor of Osteopathic Medicine (DO) program at the Philadelphia College of Osteopathic Medicine (PCOM), both the Philadelphia and Georgia campuses, were invited to participate in this survey ( $n = 1,526$ ). A total of 276 of the eligible medical students (18%) answered the first question of the survey, *Are you a 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, or 4<sup>th</sup> year medical student at Philadelphia College of Osteopathic Medicine* (Yes:  $n = 275$ ; No:  $n = 1$ ), with 26.2% ( $n = 45$ ) being students of the 1<sup>st</sup> year cohort, 21.5% ( $n = 37$ ) being students of the 2<sup>nd</sup> year cohort, 23.8% ( $n = 41$ ) being students of the 3<sup>rd</sup> year cohort, and 28.5% ( $n = 49$ ) being students of the 4<sup>th</sup> year cohort; however, the response rate varied for each question, with only 48 - 64% of the 275 DO students responding to each question. Of the participants who reported their gender, 43.4% were male ( $n = 75$ ) and 56.5% ( $n = 98$ ) were female. Of the participants who reported their campus affiliation, 71.1% ( $n = 123$ ) were from the Philadelphia campus, and 28.9% ( $n = 50$ ) were from the Georgia Campus. For more specific demographic information pertaining to gender, ethnic identity, training year, intended specialty, and state of residence, please refer to Tables 1-4 in this chapter.

Table 1

*Gender and Ethnicity*

Variable	<i>n</i>	%
Gender		
Male	75	43.4
Female	98	56.6
Ethnicity		
Arab	2	1.2
Asian American	14	8.1
African American	6	3.5
Caucasian	134	77.9
Hispanic/Latino/a	4	2.3
Biracial/Multiracial	4	2.3
Chose to not disclose	8	4.7

Table 2

*Year of Training at PCOM*

Training year	<i>n</i>	%
1 <sup>st</sup> year	45	26.2
2 <sup>nd</sup> year	37	21.5
3 <sup>rd</sup> year	41	23.8
4 <sup>th</sup> year	49	28.5

Table 3

*Intended Specialization*

Specialization	<i>n</i>	%
Anesthesia	4	2.3
Cardiology	2	1.2
Dermatology	4	2.3
Emergency Medicine	20	11.6
Family Medicine	34	19.6
General Surgery	3	1.7
Geriatrics	1	0.6
Internal Medicine	35	20.2
Neurology	7	4.0
Obstetrics and Gynecology	12	6.9
Ophthalmology	1	0.6
Orthopedics	3	1.7
Pediatrics	26	15.0
Psychiatry	3	1.7
Radiology	2	1.2
Sports Medicine	1	0.6
Surgery Specialty	4	2.3
Undecided	9	5.2
Urology	2	1.2

Table 4

*State of Residence*

State	<i>n</i>	%
Alabama	3	2.0
Colorado	1	0.7
Connecticut	1	0.7
Delaware	2	1.3
Florida	8	5.3
Georgia	19	12.4
Hawaii	1	0.7
Illinois	1	0.7
Indiana	1	0.7
Louisiana	1	0.7
Maine	1	0.7
Maryland	2	1.3
Massachusetts	2	1.3
Michigan	1	0.7
Minnesota	1	0.7
Missouri	1	0.7
New Jersey	9	5.9
New York	4	2.6
North Carolina	1	0.7
Ohio	3	2.0
Oklahoma	1	0.7
Pennsylvania	79	51.6
Tennessee	1	0.7
Texas	2	1.3
Vermont	1	0.7
Virginia	5	3.3
Wyoming	1	0.7

***Question 2: What is the general level of awareness of PANDAS among surveyed PCOM medical students?***

*(As answered by the following series of questions)*

**Question 2a: What percentage of the PCOM medical students surveyed agreed that the child in the hypothetical PANDAS vignette would benefit from integrated health care collaboration between the physician and the school psychologist?**

Table 5 shows the frequency counts for the Likert-scale responses, indicating level of agreement in response to Question #5 on the *Pediatric Autoimmune Survey: In this example, the child would benefit from the physician and school psychologist engaging in integrated healthcare collaboration.*

Table 5

*Frequency of Level of Agreement*

Level of agreement	<i>n</i>	%
Strongly disagree	11	6.3
Disagree	2	1.1
Neither agree nor disagree	6	3.4
Agree	58	33.3
Strongly agree	97	55.7

**Question 2b: What are the alternative preliminary diagnoses reported by survey participants in response to the vignette?**

Survey participants were presented with an opening vignette profiling a suspected case of PANDAS. After reading the vignette, respondents were then asked to provide their preliminary diagnostic impressions. A total of 439 diagnostic possibilities were reported by 160 participants. Of the responding participants, 21 participants reported a preliminary diagnosis of PANDAS. No one reported a diagnosis of PANS; however, 10 participants reported a preliminary diagnosis of some type of poststreptococcal sequelae, including poststreptococcal glomerulonephritis ( $n = 1$ ; 0.6%), poststreptococcal infection, unspecified ( $n = 6$ ; 3.8%), poststreptococcal psychosis ( $n = 1$ ; 0.6%), and post-streptococcal triggered tics ( $n = 2$ ; 1.3%). Additionally, six participants listed an *autoimmune response* as a possibility. Participants also reported several additional mental- health diagnoses ( $n = 265$ ; see Table 6), medical diagnoses ( $n = 109$ ; see Table 7), and environmental causes ( $n = 28$ ; see Table 8) as preliminary diagnostic impressions.

Table 6

*Frequency of Preliminary Diagnostic Impressions Categorized as Mental-Health**Diagnoses*

Diagnosis	<i>n</i>	%	Total % ( <i>n</i> = 439)
Acute Stress Disorder	1	0.4	0.2
Adjustment Disorder	3	1.1	0.7
Asperger's Disorder	4	1.5	0.9
Attention-Deficit/Hyperactivity Disorder	12	4.5	2.7
Autism Spectrum Disorder	9	3.4	2.1
Brief Psychotic Disorder	1	0.4	0.2
Childhood Disintegrative Disorder	3	1.1	0.7
Conduct Disorder	3	1.1	0.7
Conversion Disorder	3	1.1	0.7
Depression-related Disorder	5	1.9	1.1
Developmental Delay	2	0.8	0.5
Generalized Anxiety Disorder	49	18.5	14.0
Obsessive-Compulsive Disorder	28	10.6	8.0
Oppositional Defiant Disorder	1	0.4	0.2
Panic Disorder	4	1.5	0.9
Posttraumatic Stress Disorder	7	2.6	1.6
Psychiatric Disorder, Not Otherwise Specified	5	1.9	1.1
Reye's Syndrome	1	0.4	0.2
Separation anxiety	14	5.3	4.0
Schizophrenia	2	0.8	0.5
Somatization/Malingering	8	3.0	1.8
Specific Phobia	4	1.5	0.9
Tic Disorder, Not Otherwise Specified	6	2.3	1.4
Tourette's Syndrome	90	34.0	25.8



Table 7

*Frequency of Preliminary Diagnostic Impressions Categorized as Medical Diagnoses*

Diagnosis	<i>n</i>	%	Total % (n = 439)
Amyotrophic lateral sclerosis (ALS)	1	0.9	0.2
Brain tumor	7	6.4	1.6
Demyelination disease	1	0.9	0.2
Duchenne's muscular dystrophy	2	1.8	0.5
Encephalopathy	11	10.1	2.5
Epilepsy	2	1.8	0.5
Huntington's disease	2	1.8	0.5
Lyme disease	2	1.8	0.5
Measles	2	1.8	0.5
Meningococcal infection	5	4.6	1.1
Metabolic disorder	3	2.8	0.7
Neurological disorder	14	12.8	4.0
Rheumatic fever	10	9.2	2.3
Scarlet fever	1	0.9	0.2
Seizures	12	11.0	2.7
Stroke	2	1.8	0.5
Sydenham's chorea	14	12.8	4.0
Traumatic brain injury	1	0.9	0.2
Vascular Conditions	3	2.8	0.7
Viral/Bacterial/Acute Infection	14	12.8	4.0

Table 8

*Frequency of Preliminary Diagnostic Impressions Categorized as Environmental Causes*

Environmental Cause	<i>n</i>	%	Total % (n = 439)
Adverse Drug Reaction	7	25.0	1.6
Child Abuse	7	25.0	1.6
Lead or toxic poisoning	2	7.1	0.5
Psychosocial stressors	9	32.1	2.1
Sexual Abuse	1	3.6	0.2
Undetermined	2	7.1	0.5

**Question 2c: What percentage of surveyed medical students have worked with a suspected or confirmed case of PANDAS?**

Table 9 shows the frequency count for surveyed medical students who have worked with a suspected case of PANDAS.

Table 9

*Frequency Count for Surveyed Medical Students Who Have Worked with a Suspected Case of PANDAS*

Response	<i>n</i>	%
Yes	12	7.0
No	160	93.0

**Question 2d: Based on their medical training, what percentage of surveyed medical students reported feeling prepared to identify a suspected case of PANDAS?**

Table 10 shows the frequency counts for training year and training to identify PANDAS.

Table 10

*Frequency for Training Year and Training to Identify PANDAS*

Variable	Yes		No	
	<i>n</i>	(%)	<i>n</i>	(%)
First year	3	(20.0)	42	(27.5)
Second year	2	(13.3)	35	(22.9)
Third year	4	(26.7)	34	(22.2)
Fourth year	6	(40.0)	42	(27.5)

*Note.* *N* = 168.

A chi square analysis was conducted with the data presented in Table 6. Results did not indicate statistical significance ( $\chi^2 = 1.72$ ,  $df = 3$ ,  $p > .242$ ). A majority of students at each year of training indicated that they had not had specific training related to PANDAS while a student at PCOM. This pattern was slightly more pronounced for the students in years 1 (27.5% indicating no training) and 4 (27.5% indicating no training) than in years 2 and 3 (22.9% and 22.2%, respectively, indicating no training). The reported percentage (40%) is less than the hypothesized percentage (75%).

**Question 2e: What would be important for a physician to use to diagnose PANDAS?**

Table 11 shows the frequency count for the surveyed responses to Question 10 on the *Pediatric Autoimmune Survey: What would be important for a physician to use to diagnose PANDAS?*

Table 11

*Frequency Count for Important Diagnostic Measures to Use in the Diagnosis of PANDAS*

Measure	<i>n</i>	%
Titers for a GABHS infection	125	73.1
Yale-Brown Obsessive Compulsive Scale (Y-BOCS)	59	34.5
Yale Global Tic Severity Scale (YGTSS)	72	42.1
Verbal or written information provided by the school psychologist	82	48.0
Verbal or written input from the caregivers	72	42.1
Biopsychosocial history from the parent or caregiver	73	42.7
Developmental history from the parent or caregiver	73	42.7
I am uncertain	68	39.8
Other	4	2.3

*Note.* GABHS = Group A beta-hemolytic streptococcal.

**Question 2f: What treatment would DO students recommend if they suspected PANDAS?**

Table 12 shows the frequency counts for the surveyed responses to Question 10 on the *Pediatric Autoimmune Survey: What treatment would you recommend if you suspected PANDAS?*

Table 12

*Frequency Count for Treatment Recommendations*

Treatment	<i>n</i>	%
Antibiotics	21	12.4
Short course of steroids like prednisone	11	6.5
IVIG	7	4.1
Plasmapheresis	6	3.5
All of the above	15	8.8
None of the above	9	5.3
I am unsure at this point in time	101	59.4

*Note.* IVIG = intravenous immunoglobulin.

***Question 3: What is the average level of agreement that PCOM medical students report for each of the associated medical and neuropsychological impairments?***

Survey participants were invited to report their opinions, indicated as level of agreement from *Strongly Disagree* to *Strongly Agree* on a 5-point Likert scale, in support of interdisciplinary collaboration between physicians and school psychologists for certain symptom clusters commonly associated with PANDAS. Medical students were asked to rate their agreement on the following set of symptoms: OCD, tics, or other abnormal movements; severe separation anxiety and generalized anxiety; irritability, emotional lability, aggression, and personality changes; ADHD or an inability to concentrate; deterioration in learning abilities and school performance; developmental and age regression in behaviors (i.e., a deterioration in handwriting); sleep and nighttime

difficulties; and urinary frequency or daytime or nighttime secondary enuresis. Frequency data for each survey question/symptom category are reported in Tables 13 through 20.

Table 13 shows the frequency count for the agreement for integrated health care collaboration for OCD, tics, or other abnormal movements.

Table 13

*Frequency Count for Agreement for Integrated Health Care Collaboration for Obsessive-Compulsive Disorder, Tics, or Other Abnormal Movements*

Level of agreement	Training year			
	1 <sup>st</sup> year (n = 44)	2 <sup>nd</sup> year (n = 36)	3 <sup>rd</sup> year (n = 41)	4 <sup>th</sup> year (n = 49)
	n %	n %	n %	n %
Strongly Disagree	1 (2.3)	3 (8.3)	0 (0.0)	1 (2.0)
Disagree	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Neither agree nor disagree	3 (6.8)	1 (2.8)	2 (4.9)	1 (2.0)
Agree	14 (31.8)	15 (41.7)	19 (46.3)	17 (34.7)
Strongly Agree	26 (51.9)	17 (47.2)	20 (48.8)	30 (61.2)

*Note.* N = 170 instead of 171 because of an incomplete survey being counted in the survey data collection downloaded from SurveyMonkey.com. The information contained in this table is from SPSS.

Table 14 shows the frequency count for the agreement for integrated health care collaboration for anxiety.

Table 14

*Frequency Count for Agreement for Integrated Health care Collaboration for Anxiety*

Level of agreement	Training year			
	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year
	( <i>n</i> = 44) <i>n</i> %	( <i>n</i> = 36) <i>n</i> %	( <i>n</i> = 41) <i>n</i> %	( <i>n</i> = 49) <i>n</i> %
Strongly Disagree	0 (0.0)	3 (8.3)	0 (0.0)	1 (2.0)
Disagree	2 (4.5)	0 (0.0)	0 (0.0)	1 (2.0)
Neither agree nor disagree	2 (4.5)	1 (2.8)	4 (9.8)	1 (2.0)
Agree	15 (34.1)	14 (38.9)	17 (41.5)	22 (44.9)
Strongly Agree	25 (56.8)	18 (50.0)	20 (48.8)	24 (49.0)

*Note.* *N* = 170 instead of 171 because of an incomplete survey being counted in the survey data collection downloaded from SurveyMonkey.com. The information contained in this table is from SPSS.

Table 15 shows the frequency count for the agreement for integrated health care collaboration for irritability, emotional lability, aggression, or personality changes.



Table 15

*Frequency Count for Agreement for Integrated Health Care Collaboration for Irritability, Emotional Lability, Aggression, or Personality Changes*

Level of agreement	Training year							
	1 <sup>st</sup> year ( <i>n</i> = 45)		2 <sup>nd</sup> year ( <i>n</i> = 37)		3 <sup>rd</sup> year ( <i>n</i> = 40)		4 <sup>th</sup> year ( <i>n</i> = 49)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Strongly disagree	0	(0.0)	3	(8.1)	0	(0.0)	1	(2.0)
Disagree	2	(4.4)	0	(0.0)	0	(0.0)	0	(0.0)
Neither agree nor disagree	2	(4.4)	1	(2.7)	1	(2.5)	2	(4.1)
Agree	15	(33.3)	15	(40.5)	19	(47.5)	20	(40.8)
Strongly agree	26	(57.8)	18	(48.6)	20	(50.0)	26	(53.1)

*Note.* *N* = 171 instead of 172 because of an incomplete survey being counted in the survey data collection downloaded from SurveyMonkey.com. The information contained in this table is from SPSS.

Table 16 shows the frequency count for the agreement for integrated health care collaboration for ADHD or inability to concentrate.

Table 16

*Frequency Count for Agreement for Integrated Health Care Collaboration for ADHD or Inability to Concentrate*

Level of agreement	Training year							
	1 <sup>st</sup> year (n = 45)		2 <sup>nd</sup> year (n = 36)		3 <sup>rd</sup> year (n = 41)		4 <sup>th</sup> year (n = 49)	
	n	%	n	%	n	%	n	%
Strongly disagree	1	(2.2)	3	(8.3)	0	(0.0)	1	(2.0)
Disagree	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Neither agree nor disagree	3	(6.7)	0	(0.0)	1	(2.4)	2	(4.1)
Agree	18	(40.0)	15	(41.7)	19	(46.3)	23	(46.9)
Strongly agree	23	(51.1)	18	(50.0)	21	(51.2)	23	(46.9)

*Note.* N = 171 instead of 172 because of an incomplete survey being counted in the survey data collection downloaded from SurveyMonkey.com. The information contained in this table is from SPSS.

Table 17 shows the frequency count for the agreement for integrated health care collaboration for deterioration in learning difficulties and school performance.

Table 17

*Frequency Count for Agreement for Integrated Healthcare Collaboration for*

*Deterioration in Learning Difficulties and School Performance*

Level of agreement	Training year			
	1 <sup>st</sup> year (n = 45)	2 <sup>nd</sup> year (n = 37)	3 <sup>rd</sup> year (n = 41)	4 <sup>th</sup> year (n = 48)
	n %	n %	n %	n %
Strongly disagree	0 (0.0)	3 (8.1)	0 (0.0)	1 (2.1)
Disagree	1 (2.2)	1 (2.7)	1 (2.4)	1 (2.1)
Neither agree nor disagree	3 (6.7)	2 (5.4)	1 (2.4)	3 (6.3)
Agree	16 (35.6)	15 (40.5)	18 (43.9)	22 (45.8)
Strongly agree	25 (55.6)	16 (43.2)	21 (51.2)	21 (43.8)

*Note.* N = 171 instead of 172 because of an incomplete survey being counted in the survey data collection downloaded from SurveyMonkey.com. The information contained in this Table is from SPSS.

Table 18 shows the frequency count for the agreement for integrated health care collaboration for developmental and age regression.

Table 18

*Frequency Count for Agreement for Integrated Health Care Collaboration for*

*Developmental and Age Regression*

Level of agreement	Training Year							
	1 <sup>st</sup> Year (n = 45)		2 <sup>nd</sup> Year (n = 37)		3 <sup>rd</sup> Year (n = 41)		4 <sup>th</sup> Year (n = 49)	
	n	%	n	%	n	%	n	%
Strongly disagree	1	(2.2)	3	(8.1)	1	(2.4)	2	(4.1)
Disagree	0	(0.0)	0	(0.0)	0	(0.0)	2	(4.1)
Neither agree nor disagree	5	(11.1)	2	(5.4)	2	(4.9)	0	(0.0)
Agree	11	(24.4)	17	(45.9)	16	(39.0)	25	(51.0)
Strongly agree	28	(62.2)	15	(40.5)	22	(53.7)	20	(40.8)

*Note.* N = 172 instead of 173 because of an incomplete survey being counted in the survey data collection downloaded from SurveyMonkey.com. The information contained in this table is from SPSS.

Table 19 shows the frequency count for the agreement for integrated health care collaboration for sleep and nighttime difficulties.

Table 19

*Frequency Count for Agreement for Integrated Health Care Collaboration for Sleep and Nighttime Difficulties*

Level of agreement	Training year			
	1 <sup>st</sup> year (n = 45) n %	2 <sup>nd</sup> year (n = 36) n %	3 <sup>rd</sup> year (n = 41) n %	4 <sup>th</sup> year (n = 49) n %
Strongly disagree	0 (0.0)	2 (5.6)	0 (0.0)	1 (2.0)
Disagree	2 (4.4)	0 (0.0)	3 (7.3)	2 (4.1)
Neither agree nor disagree	7 (15.6)	4 (11.1)	7 (17.1)	7 (14.3)
Agree	14 (31.1)	16 (44.4)	18 (43.9)	20 (40.8)
Strongly agree	22 (48.9)	14 (38.9)	13 (31.7)	19 (38.8)

*Note.* N = 171 instead of 172 because of an incomplete survey being counted in the survey data collection downloaded from SurveyMonkey.com. The information contained in this table is from SPSS.

Table 20 shows the frequency count for the agreement for integrated health care collaboration for urinary frequency or daytime or nighttime secondary enuresis.

Table 20

*Frequency Count for Agreement for Integrated Health Care Collaboration for Urinary*

*Frequency or Daytime or Nighttime Secondary Enuresis*

Level of Agreement	Training year			
	1 <sup>st</sup> year (n = 45)	2 <sup>nd</sup> year (n = 37)	3 <sup>rd</sup> year (n = 41)	4 <sup>th</sup> year (n = 49)
	n %	n %	n %	n %
Strongly disagree	0 (0.0)	3 (8.1)	0 (0.0)	1 (2.0)
Disagree	6 (13.3)	1 (2.7)	2 (4.9)	3 (6.1)
Neither agree nor disagree	8 (17.8)	2 (5.4)	7 (17.1)	7 (14.3)
Agree	15 (33.3)	20 (54.1)	17 (41.5)	18 (36.7)
Strongly agree	16 (35.6)	11 (29.7)	15 (36.6)	20 (40.8)

*Note.* N = 172 instead of 173 because of an incomplete survey being counted in the survey data collection downloaded from SurveyMonkey.com. The information contained in this table is from SPSS.

Table 21 shows the Mean and Standard Deviation scores for symptom categories

Table 21

*Mean and Standard Deviation Scores for Symptom Categories*

Symptom category	<i>M</i>	<i>SD</i>
OCD, tics, & abnormal movements	4.40	.86
Irritability, emotional lability, aggression, & personality changes	4.38	.85
ADHD & inability to concentrate	4.35	.85
Anxiety	4.34	.88
Learning abilities and school performance	4.30	.90
Developmental and age regression	4.28	.97
Sleep and nighttime difficulties	4.10	.95
Urinary frequency and secondary nighttime enuresis	3.99	1.02

***Question 4: How do PCOM medical students respond to questions regarding integrated health care collaboration between a physician and school psychologist?***

*(As answered by the following series of questions)*

**Question 4a) How do the cohorts of PCOM medical students differ in their reporting that they have received training in interdisciplinary collaboration while a student at PCOM?**

Table 22 shows the frequency count for training year and agreement of specific training in integrated healthcare Collaboration at PCOM.

Table 22

*Frequency Count for Training Year and Agreement of Specific Training in Integrated Health Care Collaboration at PCOM*

Year of training	Yes		No	
	<i>n</i>	(%)	<i>n</i>	(%)
First year ( <i>n</i> =45)	3	(6.7)	42	(93.3)
Second year ( <i>n</i> = 37)	16	(43.2)	21	(56.8)
Third year ( <i>n</i> = 39)	11	(28.2)	28	(71.8)
Fourth year ( <i>n</i> = 49)	22	(44.9)	27	(55.1)

A chi square analysis was conducted with the data presented in Table 18. Results indicated statistical significance ( $\chi^2 = 19.75$ ,  $df = 3$ ,  $p < .001$ ). A majority of students at each year of training indicated that they had not had specific training in interdisciplinary collaboration while a student at PCOM. This pattern was more pronounced for the students in years 1 (99.3% indicating no training) and 3 (71.8% indicating no training)



than in years 2 and 4 (56.8% and 55.1%, respectively, indicating no training). The reported percentage (44.9%) is less than the hypothesized percentage (75%).

**Question 4b) What percentage of PCOM medical students would be interested in receiving more specialized training in how to participate in integrated health care collaboration with school psychologists?**

Table 23 shows the frequency count for the percentage of surveyed PCOM medical students who would be interested in receiving more specialized training in how to participate in integrated health care collaboration with school psychologists.

Table 23

*Frequency Count for Percentage of Surveyed PCOM Medical Students Who Would Be Interested in Receiving More Specialized Training in How to Participate in Integrated Health Care Collaboration with School Psychologists*

Level of Agreement	<i>n</i>	%
Strongly disagree	4	2.3
Disagree	16	9.3
Neither agree nor disagree	37	21.5
Agree	84	48.8
Strongly agree	31	18.0

**Question 4c) What percentage of PCOM medical students would be interested in providing consultation to a school-based multidisciplinary team in the future?**

Table 24 shows the frequency count for the percentage of surveyed PCOM medical students who would be interested in providing consultation to a school-based multidisciplinary team in the future.

Table 24

*Frequency Count for Percentage of Surveyed PCOM Medical Students Who Would Be Interested in Providing Consultation to a School-Based Multidisciplinary Team in the Future*

Level of agreement	<i>n</i>	%
Strongly disagree	3	1.7
Disagree	14	8.1
Neither agree nor disagree	33	19.2
Agree	85	49.4
Strongly agree	37	21.5

**Question 5: What does a working model of integrated health care collaboration look like from the perspective of PCOM medical students?**

(As reported through the following series of three questions)

**Question 5a) Which is the most preferred mode of contact?**

Table 25 shows the frequency count for the preferred mode of contact.

Table 25

*Frequency Count for the Preferred Mode of Contact*

Mode	<i>n</i>	%
Telephone	74	42.8
E-mail	55	31.8
Written communication	24	13.9
Face-to-face meeting	17	9.8
Other	3	1.7

**Question 5b) What is the biggest barrier to effective interdisciplinary health care collaboration?**

Table 26 shows the frequency count for the biggest reported barrier to effective integrated health care collaboration.

Table 26

*Frequency Count for the Biggest Reported Barriers to Effective Integrated Health Care*

*Collaboration*

Barrier	<i>n</i>	%
Time constraints	138	79.8
Confidentiality and protection for HIPAA	11	6.4
Different diagnostic references	5	2.9
Different terminology between systems	3	1.7
Unsure how to initiate contact with the school psychologist	9	5.2
Other	7	4.0

*Note.* HIPAA = Health Insurance Portability and Accountability Act of 1996.

**Question 5c) What are the most important assets for a school psychologist to possess?**

Table 27 shows the frequency count for the most important asset for a school psychologist to possess.

Table 27

*Frequency Count for the Most Important Asset*

Asset	<i>n</i>	%
Focused assessment	62	36.3
Time and session efficiency	37	21.6
Decisive decision making	13	7.6
Flexibility	22	12.9
Understanding of medical conditions, procedures, and medications	37	21.6

## Chapter Five

### Discussion

#### Overview

Medical students at Philadelphia College of Osteopathic Medicine (PCOM) were invited to voluntarily provide responses to questions of interest to the survey titled *Pediatric Autoimmune Survey*. The primary purpose of this study was to survey medical students at PCOM in order to explore PCOM medical students' awareness of PANDAS, to assess their self-reported level of agreement in the value of participating in integrated health care collaboration with school psychologists on associated medical and psychological impairments, and to determine important considerations for the pediatric school psychologist to consider in order to maximize opportunity for successful integrated health care collaboration, as seen by the PCOM DO student. Secondary goals of this study were (a) to bring awareness to school psychologists about the specific communication styles and skills desired by future physicians for successful interdisciplinary collaboration, specifically for pediatric cases of suspected or diagnosed PANDAS (b) to bring awareness to future physicians about the important role that school psychologists play in the coupling of psychosocial care with medical needs (c) to advocate for increased opportunities for students from all programs at PCOM to participate in integrated health care initiatives on campus; and (d) to advocate for courses that advance an integrated approach to health care at PCOM, including the relationship between physician and school psychologist. Of the 1,526 eligible medical students, 18% of the DO students at PCOM voluntarily provided responses to the survey questions, with varying response rates by question. As a result, data collected from this survey were

based on an average of 11% of medical students responding from the Philadelphia and the Georgia campuses of PCOM.

Interest in pediatric autoimmune neuropsychiatric disorders was piqued when researchers at the National Institute of Mental Health (NIMH) were conducting parallel studies of childhood-onset OCD and Sydenham chorea in the early 1990s. Sydenham chorea is a neurological disorder of childhood, long suspected to have an autoimmune origin, characterized by rapid, irregular, and involuntary movements of the arms, legs, trunk, and facial muscles and may also include uncoordinated movements, muscular weakness, stumbling and falling, slurred speech, difficulty concentrating and writing, and emotional instability (Pavone et al., 2006). The level of symptom severity can vary from slight to incapacitating.

The NIMH researchers observed that some of the children had an unusually abrupt onset of symptoms, without chorea, followed by vacillating cycles of symptom dormancy and exacerbation. Upon closer investigation, the NIMH investigators discovered that the course of symptoms expressed in the children studied usually occurred in response to the presence of a viral or bacterial infection. This discovery led Swedo and colleagues to suggest a relationship between pediatric autoimmune neuropsychiatric disorders and group A beta-hemolytic streptococcal (GABHS) infection, with the assumption that the symptoms are not caused by the strep infection itself, but by the body's reaction to the infection (Swedo & Grant, 2005).

To date, PANDAS remains a rare and highly controversial clinical diagnosis. Many physicians have never heard of PANDAS, and many who have would not diagnosis it because it lacks firm support from the medical community at large. This

practice is supported by the fact that it is not a recognized medically coded disorder. One of the primary goals of this study was to explore how aware PCOM medical students are about varying elements of PANDAS, including diagnosis and treatment. The second primary goal of this study was to explore how receptive surveyed medical school participants would be to engaging in integrated health care collaboration with a school psychologist at some point in their careers, using a complex medical problem like PANDAS as a mediator, in order to establish important considerations for school psychologists to think about when approaching a physician to discuss a shared pediatric case. This goal is especially important as the field of pediatric school psychology advances.

### **Summary of the Results**

#### ***Research Question 1: What are the demographic characteristics of surveyed PCOM medical students?***

The first research question addressed the demographic characteristics of PCOM medical students. All medical students in years 1 through 4 of the Doctor of Osteopathic Medicine (DO) program at the Philadelphia College of Osteopathic Medicine (PCOM), both the Philadelphia and Georgia campuses, were eligible to participate in this survey ( $n = 1,526$ ). A total of 276 of the eligible medical students (18%) answered the first question of the survey, *Are you a 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, or 4<sup>th</sup> year medical student at Philadelphia College of Osteopathic Medicine* (Yes:  $n = 275$ ; No:  $n = 1$ ), with 26.2% ( $n = 45$ ) being students of the 1<sup>st</sup> year cohort, 21.5% ( $n = 37$ ) being students of the 2<sup>nd</sup> year cohort, 23.8% ( $n = 41$ ) being students of the 3<sup>rd</sup> year cohort, and 28.5% ( $n = 49$ ) being students of the 4<sup>th</sup> year cohort; however, the response rate varied for each question, with only 48 - 64% of the

275 DO students responding to each question. Of the participants who reported their gender, 43.4% were male ( $n = 75$ ) and 56.5% ( $n = 98$ ) were female. Of the participants who reported their campus affiliation, 71.1% ( $n = 123$ ) were from the Philadelphia campus and 28.9% ( $n = 50$ ) were from the Georgia campus. For more specific demographic information pertaining to gender, ethnic identity, training year, intended specialty, and state of residence, please refer to Tables 1-4 in Chapter 4.

One-hundred-seventy-three students provided a response to the question, *Including friends and family, how many school psychologists do you know on a personal or professional level?* Of these responses, 106 students (61.3%) indicated that they did not know a school psychologist on a personal or professional level. Of the 173 individuals who responded to the survey question, 34% reported knowing one to two school psychologists, and only 5% reported knowing three to four school psychologists. No one reported knowing more than four school psychologists. Of the 171 participants who responded, 161 (94.2%) students indicated that they did not have a certified school psychologist in their family, while 10 (5.8%) did. Several respondents indicated that they have an ongoing social relationship with a school psychologist (27; 15.7%), while 145 students (84.3%) indicated that they do not.

In addition to several other medical and clinical programs on the Philadelphia campus, PCOM offers three different degrees in School Psychology (PsyD, EdS, MS). A fair assumption to make would be that more DO students would report knowing at least one school psychologist if there appeared to be a consistent amount of interaction between the two disciplines on campus. This level of interaction does not appear to be achieved, according to the responses collected from this set of survey questions.



***Research Question 2: What is the general level of awareness of PANDAS among surveyed PCOM medical students?***

The second research question addressed the general level of awareness of PANDAS among PCOM medical students through a subseries of five separate survey questions (numbers 4, 7, 8, 10, & 11). Specifically, questions targeted whether DO students could identify a suspected case of PANDAS based on a hypothetical vignette; whether DO students have worked with a suspected or confirmed case of PANDAS; whether DO students' medical training at PCOM has prepared them to identify a suspected case of PANDAS; whether DO students are aware of specific diagnostic measures commonly used to diagnosis PANDAS; and DO students' awareness of medical treatment recommendations for PANDAS common in the literature. Of the 169 participants who responded to Question 8 (*Has your medical training so far prepared you to identify a suspected case of PANDAS?*), an overwhelming majority - 153 participants (90.5%) - reported that their medical training so far has not prepared them to identify a suspected case of PANDAS. A much smaller percentage of students (9.5%), in total 15 students, indicated that their medical training has prepared them to identify a suspected case of PANDAS. By self-report, only 3 of 45 responding individuals from the 1<sup>st</sup> year training cohort, 2 of 35 responding individuals from the 2<sup>nd</sup> year cohort, 4 of 34 responding individuals from the 3<sup>rd</sup> year cohort, and 6 of 42 responding individuals from the 4<sup>th</sup> year cohort responded in agreement, with the overwhelming majority of participants reporting feeling unprepared.

It was hypothesized that as year of training increased, at least 75% of surveyed DO students in their fourth year would report that their medical training had prepared

them to identify suspected cases of PANDAS. A much higher response rate in training years 3 and 4 would be assumed, as medical students spend more time in direct patient care opportunities; however, this assumption was not found to be true in the sample population. Survey results did not support this hypothesis, instead showing no significant differences among the four years of training and agreement that students felt prepared to identify a suspected case of PANDAS and only 40% agreement by the fourth year, with almost 28% disagreement. This finding could be the case for several reasons; however, it is likely because PANDAS is a clinical diagnosis, which is counterintuitive to the application of biomedical knowledge and, therefore, most likely not emphasized during instructional practice.

Of those surveyed, 11 (7%) of the participating medical students reported that they had actually worked with a suspected or confirmed case of PANDAS; whereas the overwhelming majority of individuals (94%) had not. Relatively speaking, this percentage is a fair amount considering the rarity, complexity, and controversial nature of a PANDAS diagnosis. According to the breakdown of survey data by training year, three students from the 1<sup>st</sup> year and 3<sup>rd</sup> students from the third year DO cohorts have worked with a confirmed or suspected case of PANDAS. Five students from the 4<sup>th</sup> year cohort have worked with a confirmed or suspected case of PANDAS. No one from the 2<sup>nd</sup> year cohort reported working with a confirmed or suspected case of PANDAS. At PCOM, the first 2 years of training mostly involve coursework, so it is not surprising that these two cohorts would report less direct exposure to confirmed or suspected cases of PANDAS ( $n = 3$ ). As expected, more students from years 3 and 4 ( $n = 8$ ) reported working with a confirmed or suspected case of PANDAS. This expectation is reasonable, given that

students in their later years of medical school are more active in direct patient care opportunities at community-based health care facilities.

When presented with an opening vignette about a suspected PANDAS case, only a few medical students reported the possibility of PANDAS or an associated post-streptococcal-related illness (i.e., poststreptococcal glomerulonephritis). While not emphasized within the scope of this study, Pediatric Acute-onset Neuropsychiatric Syndromes (PANS) was established by the NIMH in 2012 as a possibility when strep cannot be associated with the onset of symptoms (Swedo et al., 2012). No one specifically mentioned PANS in the survey; however, a full gamut of possible medical, mental-health, and environmental diagnoses were reported, with one third of respondents reporting Tourette syndrome, OCD, or another tic disorder as a possibility. Mell et al. (2005) reported epidemiologic evidence for PANDAS induced by childhood streptococcal infection in their case-control sample of children 4 to 13 years old who were first diagnosed with OCD, Tourette syndrome, or a tic disorder. Typically, hallmark symptoms of OCD (obsessive thoughts, compulsive behaviors, motor and vocal tics) begin gradually, not abruptly, as reported in PANDAS. An initial diagnosis of PANDAS can be delayed because other immune system diseases, such as Lyme disease, celiac disease, lupus, Kawasaki disease, acute rheumatic fever, and others also can cause OCD to appear suddenly (Stewart & Murphy, 2010). The strong presence of responses indicating these diagnoses as preliminary diagnoses supports the literature findings that suggest that the focus of the symptom etiology is more readily associated with something other than PANDAS initially.

The basal ganglia region of the brain is the suspected seat of autoimmune susceptibility in PANDAS. Of the more than 400 possible diagnostic responses given, only one survey participant reported an association to the basal ganglia area of the brain by suggesting reduced glutamate release from the globus pallidus as a possible diagnosis. The symptoms associated with PANDAS are not believed to be caused by the strep infection itself, but by the body's reaction to the infection (Swedo & Grant, 2005). In review of survey responses, only six respondents indicated an autoimmune disorder as a preliminary diagnostic impression.

Question 10 investigated the medical students' awareness pertaining to what the current literature base offers as recommendations in the clinical diagnosis of PANDAS. The students were given choices of measures reported in the literature, and they were told that they could check all that applied. In response to this question, 39.8% ( $n = 68$ ) responded that they were uncertain. Of the remaining responses, 125 students (73.1%) reported use of titers for GABHS infection as the number-one measure. Additional measures included verbal or written information provided from the school psychologist (48%,  $n = 82$ ); a biopsychosocial history from the parent or caregiver (42.7%,  $n = 73$ ); a developmental history from the parent or caregiver (42.7%,  $n = 73$ ); verbal or written input from the caregivers (42.1%,  $n = 72$ ); the Yale Global Tic Severity Scale (42.1%,  $n = 72$ ); and the Yale-Brown Obsessive Compulsive Scale (34.5%,  $n = 59$ ). Six participants offered feedback. One individual recommended ordering a comprehensive metabolic panel and a complete blood count. Another individual recommended ordering an erythrocyte sedimentation rate. Three individuals added that they would not give

PANDAS as a diagnosis because of its lack of acceptance in the medical community as a recognized disease.

According to the research, a rapid and/or culture throat swab to test for strep is done as a follow-up if an infection is suspected. If the throat swab does not show any signs of strep, a blood test for an antibody called Anti-Streptolysin O can also be done (Stewart & Murphy, 2010). Two of the most common instruments utilized are the Yale Brown Obsessive-Compulsive Scale and the Yale Global Tic Severity Scale. Of those surveyed, only 34.5% reported using the Yale Brown Obsessive-Compulsive Scale and only slightly more students (42%) reported that they would use the Yale Global Tic Severity Scale. An interesting finding was that almost half (48%) of the respondents reported that they would use verbal or written information provided from the school psychologist as a means to diagnose PANDAS. Communication between the physician and the school psychologist is rarely emphasized in the literature as a diagnostic consideration, but if nothing more, it lends support to using this research as a platform to increase dialogue between disciplines on behalf of shared clients.

Survey Question 11 asked medical students to select which treatment they would recommend in the treatment of PANDAS from a list of suggested treatments reported in the literature. The majority of participants (59.4%,  $n = 101$ ) indicated that they were uncertain. Of the 171 responses received, 12.4% ( $n = 21$ ) reported the use of antibiotics; 6.5% ( $n = 11$ ) reported a short course of steroids, like prednisone; 4.1% ( $n = 7$ ) reported intravenous immunoglobulin; and 3.5% ( $n = 6$ ) reported using plasmaphoresis. Additionally, 8.8% ( $n = 15$ ) reported using all of the listed treatments, and 5.3% ( $n = 9$ ) reported using none of the listed treatments. The fact that the majority of participants

indicated that they were uncertain, and that only a small percentage of medical students reported treating the strep infection first, speaks to a general lack of personal and professional awareness regarding the treatment of PANDAS.

While this survey focused on medical students, the larger medical community continues to debate the topic of PANDAS, with mixed reception. Murphy et al. (2010) proposed the following:

A major shortcoming of the PANDAS hypothesis has been the small number of prospective studies examining the temporal relationship between antecedent GAS infections and the onset or exacerbations of tic and OC symptoms (Luo et al. 2004; Murphy et al. 2004; Perrin et al. 2004; Kurlan et al. 2008; Lin et al. 2009; Leckman et al., in submission). Only two of these longitudinal studies prospectively identified PANDAS cases, using the published diagnostic criteria proposed by Swedo et al. (1998). Neither of these studies provides a strong support for the PANDAS hypothesis (Kurlan et al. 2008; Leckman et al., in submission). Kurlan et al. (2008) reported the results of a prospective, multicenter study of children who met stringent criteria for PANDAS and matched children with OCD or tic disorders who completed monthly throat cultures, 3-month blood antibody tests, and monthly phone or in-clinic evaluations for an average of 2 years (Kurlan et al. 2008). Although they did find a significantly higher rate of GAS infections as well as a higher rate of clinical exacerbations among the PANDAS cases, no more than 25% of the exacerbations in the PANDAS cases were temporally associated with a GAS infection. The more recent study by Leckman et al. (in submission) provides even less support for the PANDAS

hypothesis because all the GAS-linked symptom exacerbations occurred in the non-PANDAS cases. (p. 320)

PANDAS is controversial within the medical community largely because PANDAS is a clinical diagnosis, relying less on laboratory results and more on a carefully taken history and physical examination. The medical model regards symptoms and behaviors as indicative of an underlying physical or biologically based abnormality within the individual. Perhaps one survey participant best conceptualized the “medical mindset” of the surveyed individuals by stating, “[PANDAS] is counter-intuitive; really, it just kind of defies most established mainstream medical theory.”

In summary, the survey data could intentionally show a lack of PANDAS awareness because the medical students are doing what they are trained to do - place more emphasis on using the biomedical model and less emphasis on using the biopsychosocial model when conceptualizing symptoms in consideration of particular diagnoses. School psychologists face a similar challenge with children who could meet the diagnostic criteria for PANDAS in the school system. While these children may not meet the criteria for special-education services, they still may require intensive support and understanding, making it even more important for the two professions to work together, if for nothing else than to serve to remind each other that it is not a *diagnosis* that they are treating, but a *child*.

***Research Question 3: What is the average level of agreement that PCOM medical students report for each of the associated medical and neuropsychological impairments?***

Tables 13 through 21 in Chapter 4 provide a more detailed representation of the breakdown of responses to each symptom category. Of the 171 participants who responded to Survey Question 12, the majority ( $n = 158$ , 92.4%) of the medical students who responded to this survey question reported agreement ( $M = 4.40$ ,  $SD = .86$ ) in seeing the value in a physician and school psychologist engaging in integrated health care collaboration on behalf of children with OCD, tics, or other abnormal movements. Specifically, six (3.5%) participants strongly disagreed, no one disagreed, seven (4.1%) participants reported neutral feelings, 65 (38%) reported agreement, and 54% ( $n = 93$ ) of those surveyed felt strongly that interdisciplinary collaboration for this cluster of symptoms would be valuable.

Of the 171 survey participants who responded to Survey Question 13, *From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated health care collaboration on behalf of children with severe separation anxiety/generalized anxiety*, five (2.9%) survey participants strongly disagreed, three (1.8%) participants disagreed, eight (4.7%) participants neither agreed nor disagreed, 66 (39.8%) participants agreed, and 87 (50.9%) participants strongly agreed in the value of integrated health care collaboration for anxiety-related symptoms ( $M = 4.34$ ,  $SD = .88$ ).

Of the 172 responses received for Survey Question 14, *From my point of view as a DO student, I see the value in a physician and school psychologist engaging in*



*integrated healthcare collaboration on behalf of children with irritability, emotional lability, aggression, or personality changes*, the majority ( $M = 4.38$ ,  $SD = .85$ ) of the responders either strongly agreed ( $n = 90$ , 52.3%) or agreed ( $n = 69$ , 40.1%). Six (3.5%) participants did not have an opinion either way, two (1.2%) individuals disagreed, and five (2.9%) individuals strongly disagreed.

Of the 172 responses received for Survey Question 15, *From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with ADHD or an inability to concentrate*, the majority ( $M = 4.35$ ,  $SD = .85$ ) of the responders either strongly agreed ( $n = 85$ , 49.4%) or agreed ( $n = 75$ , 43.6%). Six (3.5%) participants did not have an opinion either way, and no one disagreed (0.0%); however, six (3.5%) individuals strongly disagreed.

Of the 172 responses received for Survey Question 16, *From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with deterioration in learning abilities and school performance*, the majority ( $M = 4.30$ ,  $SD = .90$ ) of the responders either strongly agreed ( $n = 83$ , 48.3%) or agreed ( $n = 71$ , 41.3%). Nine (5.2%) participants did not have an opinion, four (5.2%) participants disagreed, and five (2.9%) individuals strongly disagreed.

Of the 173 responses received for Survey Question 17, *From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with developmental and age regression*, the majority ( $M = 4.28$ ,  $SD = .97$ ) of the responders either strongly agreed ( $n$

= 85, 49.1%) or agreed ( $n = 69$ , 39.9%). Nine (5.2%) participants did not have an opinion, two (1.2%) participants disagreed, and eight (4.6%) individuals strongly disagreed.

Of the 172 responses received for Survey Question 18, *From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with sleep and nighttime difficulties*, an equal number of survey participants strongly agreed ( $n = 68$ , 39.5%) and agreed ( $n = 68$ , 39.5%). Seven (4.1%) participants disagreed and four (2.3%) individuals strongly disagreed. In contrast, 14.5% ( $n = 25$ ) neither agreed nor disagreed ( $M = 4.10$ ,  $SD = 1.02$ ).

Of the 173 participants who responded to Survey Question 19, the majority ( $n = 132$ , 76.3%) of the medical students either strongly agreed ( $n = 62$ , 35.8%) or agreed ( $n = 70$ , 40.5%) in seeing the value in a physician and school psychologist engaging in integrated health care collaboration on behalf of children with urinary frequency or daytime or nighttime secondary enuresis ( $M = 3.99$ ,  $SD = 1.02$ ). Specifically, five (2.9%) participants strongly disagreed, 12 (6.9%) agreed, and 24 (13.9%) participants reported neither agreement nor disagreement.

In review of the medians (the middle score of the distribution) for Survey Questions 12 through 19, the first three questions had median scores of 5; whereas the subsequent questions had median scores of 4. In review of the mean average for the highest levels of agreement, the survey participants indicated that integrated health care collaboration would be the most beneficial for children with OCD, tics, and abnormal movements. Following at a close second was the symptom category of irritability,

emotional lability, aggression, and personality change. Integrated health care collaboration for ADHD and inability to concentrate was just slightly ahead of integrated health care collaboration for anxiety. These symptoms can interfere with functioning across more than one major life domain, prompting the need for integrated health care collaboration; therefore, it is not surprising that these symptoms received more agreement than the others. These symptoms also have been shown to respond best to medication, which is another possible reason for their selection ahead of the others.

***Research Question 4: How do PCOM medical students respond to questions regarding integrated health care collaboration between a physician and school psychologist?***

The fourth research question explored how respondents answered a subseries of three questions pertaining to training and self-reported interest regarding integrated health care collaboration between a physician and a school psychologist. It was hypothesized that the number of affirmative responses would gradually increase as the year of training advanced, with achievement of at least 75% agreement in year 4. A chi square analysis was conducted with the data presented in Table 18. Results indicated statistical significance ( $\chi^2 = 19.75, df = 3, p < .001$ ). A majority of students at each year of training indicated that they had not had specific training in interdisciplinary collaboration while a student at PCOM. This pattern was more pronounced for the students in years 1 (99.3% indicating no training) and 3 (71.8% indicating no training) than in years 2 and 4 (56.8% and 55.1%, respectively, indicating no training). In review of the response pattern for the dissenters, for the first year of training only three of 45 survey responders reported that they had received training at PCOM. By the fourth year, only 45% of those responding indicated that they had received training. If there were a formal or consistent method of

training, an assumption to expect to see at least 75% agreement by the last year of medical school would be fair.

Survey participants were also asked to respond to two different questions in regard to the level of interest in individual participation in activities that promote integrated health care collaboration. In response to the first question (Survey Question 20), *I would be interested in receiving more specialized training in how to participate in effective integrated healthcare collaboration with school psychologists*, 18% ( $n = 31$ ) reported strong agreement, 48.8% ( $n = 84$ ) reported agreement, 21.5% ( $n = 37$ ) neither agreed nor disagreed, 9.3% ( $n = 16$ ) disagreed, and 2.3% ( $n = 4$ ) strongly disagreed. The mean response was 3.71 ( $SD = .95$ ). In response to Survey Question 21, *I would be interested in providing consultation to a school-based multidisciplinary team in the future*, 21.5% ( $N = 37$ ) reported strong agreement, 49.4% ( $N = 85$ ) agreed, 19.2% ( $N = 33$ ) expressed neutrality, 8.1% ( $N = 14$ ) disagreed, and 1.7% ( $N = 3$ ) strongly disagreed. The mean response was 3.81 ( $SD = .93$ ).

In regard to interest, approximately 67% of those surveyed would be interested in receiving more specialized training in how to participate in effective integrated health care collaboration with school psychologists. Administrators at PCOM could not be sure exactly how many individuals would actively seek out opportunities on their own; however, this strong reporting percentage of people who expressed interest may attend cosponsored events or be receptive to including instructional practices that advocate for integrated health care collaboration with educators in the curriculum at PCOM, if not for a core class, certainly as an optional elective. Considering that more than 70% of survey responders expressed interest in being a consulting member of a school-based

multidisciplinary team, providing medical students the appropriate consultative tools and a familiarity with school systems in order to be able to do so effectively would be helpful.

***Research Question 5: What does a working model of integrated health care collaboration look like from the perspective of PCOM medical students?***

Three questions were offered as a way to explore the most preferred method of contact, the greatest barriers to collaboration, and the most important assets for a school psychologist to possess for successful integrated health care collaboration. Of the 173 participants who responded to the survey, the most preferred method of communication was reported as telephone communication at 42.8%, followed by email (31.8%). The striking difference between the two is a matter of financial gain versus convenience, which is mostly subject to personal preference. As one survey participant pointed out, “telephone is billable, but email is easier.” Two other participants offered “written communication first, followed by a more in-depth discussion if needed.” Another participant listed Skype as an option, which may be the optimal way to strike a balance between financial reimbursement and convenience.

Of the 173 participants who responded, an overwhelming majority reported “time constraints” as the biggest barrier to effective interdisciplinary health care collaboration. Trailing significantly behind, 11 (6.4%) participants reported protection of patient confidentiality and concern for violation of the Health Insurance Portability and Accountability Act (HIPAA) of 1996 as the second biggest barrier, although a signed release of information consent form could alleviate this barrier. Several respondents offered comments about additional barriers, which included limited-to-no financial reimbursement for interdisciplinary collaboration, a lack of interest by either the school

psychologist or the physician, and logistical considerations pertaining to conflicting working schedules. One participant pointed out that certain specializations (i.e., surgery or anesthesiology) would probably not have a need to consult with a school psychologist as much as a primary care physician or psychiatrist would, for instance.

Of the 171 participants who responded to Survey Question 24 regarding the most important assets for a school psychologist to possess, 36.3% ( $n = 62$ ) identified “focused assessments” as the most important asset the school psychologist needs to possess for successful integrated health care collaboration between physicians and school psychologists. Thirty-seven (21.6%) individuals each reported “time and session efficiency” and “understanding medical conditions, procedures, and medications,” as the second most important considerations. “Flexibility” and “decisive decision making with diverse and limited data” collectively received less than 20% agreement.

In review of the reported preferences, conceptually, most medical students reported that “time is of the essence.” In order to make the most efficient use of this limited amount of time physicians can give, school psychologists need to come to them with brief and concise requests. In review of the theoretical models of collaboration that were presented in Chapter 2, one can infer by the information collected from this survey that physicians-in-training would consider collaboration with a school psychologist at some point in their career, adhering to the principles of the biopsychosocial model (Engle, 1977).

To further capitalize on this opportunity, school psychologists should use their own systematic data collection method, such as that found in the behavioral collaboration model, prior to going to a physician to insure that they are bringing their own data to

share collaboratively with the physician. In this model, Bergan and Kratochwill (1990) identified four fundamental steps in the behavioral collaboration process: (a) problem identification, (b) problem analysis, (c) plan implementation and progress monitoring through ongoing data collection, and (d) problem evaluation. Further, should the trend in integrated health care collaboration evolve to include physicians (i.e., primary care physicians, psychiatrists, etc.) as consultants and multidisciplinary team members, collaboration would likely capitalize on the tenets of the problem-solving (i.e., school-based) collaboration model.

### **Limitations of the Study**

This study is restricted by several limitations. The seemingly most critical limitation of this study pertains to survey methodology. In regard to sample size, of the 1,526 eligible PCOM students at both campuses, only approximately 11% provided answers to the survey questions. Further limiting in regard to sample size is the fact that only PCOM medical students, only a small subset of the general DO student population, were surveyed, and this study did not include medical students from allopathic programs. In total, this limitation significantly affects external validity, or the generalizability of the study. In fact, the sample size was too small to use inferential statistics for most of the survey comparisons, necessitating the sole use of descriptive statistics. As a result, no significant relationships can be concluded from the data, as statistical tests normally require a larger sample size to ensure a representative distribution of the population to whom results will be generalized or transferred. As such, the information provided in this survey can serve as nothing more than assumed considerations.

A review of the data indicated that 276 students logged on to the survey and answered the first set of inclusionary questions. As the survey progressed, the range of responses provided for each survey question was 160 to 173 students. There was no way to determine conclusively why this was the case. A lack of data or of reliable data further limits the scope of data analysis and sample size. Additionally, this lack can be a significant obstacle in finding trends and meaningful relationships.

Another methodological limitation concerns the limited scope of existing literature on the coexistence of the two selected research topics: PANDAS and integrated health care collaboration associated with pediatric school psychology. While most existing research bases were pursued, laying a direct foundation to support the research interest was challenging. Most of the research that exists on these two topics is still in the stages of infancy and very much aimed at advocacy and general awareness. As such, the research goals for this particular study were paralleled to focus on advocacy and awareness initiatives.

An additional methodological flaw concerned the investigator-generated measure of self-reporting, a survey titled *Pediatric Autoimmune Survey*. While face validity was subjectively evaluated by doctoral-level professionals, other means of validity could not be established. The lack of objective validity significantly limits the potential use of this instrument as a means of inferring any meaningful interpretations. In retrospect, the use or redesign of existing surveys that have had their statistical properties already validated may have permitted for more distinct research questions to be formulated and tested using more sophisticated statistical methods to draw more meaningful conclusions.



Another limitation pertained to survey recruitment. Relying solely on email distribution may have limited certain people from taking the survey for a variety of personal reasons (i.e., time constraints). For undisclosed reasons, approximately 100 individuals who logged on to the survey, either did not complete the survey or only partially answered some of the questions. Some students may have attempted to take the survey, but did not find the topic interesting. Others may have felt that the survey would take too much time. Yet others may have just logged on to the survey to be eligible to participate in the voluntary gift card drawing.

In some cases, research problems and hypotheses are too narrowly defined. In this instance, the research problems and hypotheses may have been too general and too multidirectional. In addition, this study did not provide operational definitions for terminology (i.e., “focused assessments” or “time constraints”), which suggests that there was not a universally understood method of defining areas of interest. As a result, the research questions were used to explore different facets in tandem with one another, but not necessarily in unison, thus limiting any meaningful comparisons. In consideration of the methodological limitations, the recommendation is made that this study be used as a pilot study intended to lay the groundwork for a more complete research study in the future.

### **Implications for Practice**

Overall, this study aimed to coinvestigate two discrete areas of personal interest for the responsible investigator: PANDAS and integrated health care collaboration. The primary aim of this study was to survey medical students at PCOM in order to explore PCOM medical students’ awareness of PANDAS, to assess their self-reported level of

agreement in the value of providing integrated health care collaboration with school psychologists on associated medical and psychological impairments, and to determine important considerations for the pediatric school psychologist to consider in order to maximize opportunity for successful integrated health care collaboration. Secondary goals of this study were (a) to bring awareness to school psychologists about the specific communication styles and skills desired by future physicians for successful interdisciplinary collaboration, specifically for pediatric cases of suspected or diagnosed PANDAS; (b) To bring awareness to future physicians about the important role that school psychologists play in the coupling of psychosocial care with medical needs; and (c) To advocate for the inclusion of various discussion elements related to integrated health care collaboration between physicians and school psychologists to be put into the graduate curriculum at PCOM, including increased opportunities for interdisciplinary interaction on campus. In terms of the descriptive information that was obtained from this survey, this research can be used as a pilot study to further future research initiatives in the field of school psychology as well as integrated health care collaboration efforts at PCOM.

A growing literature base supports that infection with streptococcus in children results in such neuropsychological sequelae as motor and vocal tics and symptoms consistent with OCD among children that impact functioning in the school setting (Gabbay & Coffey, 2003; Mink & Kurlan, 2011). Children diagnosed with complex medical disorders, such as PANDAS, require strong intersystemic relationships from various disciplines to assist in diagnosing, assessing, and treating the disorder. With the increasing passage of federal statutes (see Preventive Health Amendments of 1992 [PL

102-531]; The Alcohol, Drug Abuse, and Mental Health Administration Reorganization Act of 1992 [PL 102-321]; and the Education of the Handicapped Act Amendments of 1990 [PL 101-476], now titled Individuals with Disabilities Education Act [IDEA], the role of the school psychologist is evolving to meet the increasing mandates for services for children with health-related needs who attend school.

The American Academy of Pediatrics' Committee on School Health (2001) offered recommendations on the potential for expanded school health services to address the full range of medical and psychological needs of children, making clear that many professional disciplines must work together to achieve this outcome and bring their respective areas of expertise to school (Brown, 2004). The APA's *Blueprint for Change: Achieving Integrated Health Care for an Aging Population* (2008) outlined several ways psychologists can contribute to help physicians in health care settings:

- Conduct cognitive, capacity, diagnostic, and personality assessments that differentiate normal processes from pathology, side effects of medications, adjustment reactions, or combinations of these problems.
- Diagnose and treat mental- and behavioral-health problems (e.g., depression, suicide risk, anxiety disorders, addiction, and insomnia).
- Offer consultation and recommendations to family members, significant others, and other health care providers
- Contribute research expertise to the design, implementation, and evaluation of team care and patient outcomes.
- Develop interventions that are responsive to specific individual and community characteristics that may impact the treatment plan.(p. 8)

School psychologists have been trained to execute a similar set of responsibilities in an educational setting; however, historically, school psychologists have not been recognized for the attributes that they can offer to physicians, nor have they been able to evolve their service role very far outside the scope of strictly assessing for student eligibility for special-education services. However, with a greater number of children coming to school with needs that extend beyond the educational domain, a greater emphasis will need to be placed on the services the school psychologist can offer these children that extend across all domains of functioning-medically, educationally, and psychosocially. This offering will entail ongoing collaboration with those individuals in the medical community who share responsibility for the individual child.

School health services can be an effective venue for integrating psychosocial care and education with medical care (Brown, 2004). As more chronically ill children are reintegrated into school, school psychologists must be prepared to work with these children at school. The resulting model of this study, *A Working Model of Integrated Health Care Collaboration & Consultation for PANDAS/PANS* (see Figure 1), provides a conceptualization of the general findings from this study, as they relate to the primary roles and responsibilities of the physicians and the school psychologists who likely would become involved in collaborating for children with PANDAS/PANS or related illnesses. In addition, the model serves as a reference guide for ways each profession can assist the other to make collaboration a more fluid process for the child and family at various stages along the continuum of needs.

One of the most prominent findings from this study is the overwhelming support that the medical students at PCOM endorsed for future collaboration efforts with school

psychologists, both in practice and at PCOM. It is a promising start to promoting awareness for the collaborative pairing of physicians and school psychologists for shared cases. Further, the positive response from this survey dispels the assumptions that the two fields are incompatible and have very little to offer each other and that physicians have no interest in collaborating outside their field. In fact, the medical students who responded to the survey overwhelmingly agreed that the child could benefit from interdisciplinary collaboration for all related symptoms, although some symptoms had more agreement than others.

To optimize successful collaborative efforts, school psychologists must prioritize a few considerations. For instance, physicians likely have limited time and that they are more inclined to want direct and concise requests from the school psychologist. While very much left to personal preference, phone calls and email were the most preferred ways to engage in collaborative efforts; however, the school psychologist should keep in mind that sessions that are not billable should be brief and efficient, as “time constraints” and not being able to bill for sessions were the two biggest identified barriers to interdisciplinary collaboration. As such, school psychologists could advocate for a district medical consultant who is on a fee-for-service consulting basis who could also attend a monthly student assistance team meeting or provide staff trainings to bring a medical perspective to intervention planning with staff and parents.

In reference to the biopsychosocial model, in *A Working Model of Integrated Health Care Collaboration and Consultation for PANDAS/PANS*, the child suspected of having PANDAS/PANS is at the center of three interactive domains: biological, psychological, and social. The school psychologist is positioned to play a pivotal role in

helping to facilitate communication between disciplines, to advocate for the child's needs across domains, and to assist with PANDAS-specific needs in the educational setting. Similar to a response-to-intervention-type model, this model offers service delivery suggestions for three stages: Prevention, School-Based, and Child-Centered/PANDAS-Specific.

PANDAS is rare, with a conservative estimate of 162,000 cases a year ([www.pandasnetwork.org](http://www.pandasnetwork.org)). Most school psychologists will never work with a child suspected of having PANDAS, let alone a confirmed case; however, school psychologists need to be aware of the associated neuropsychiatric sequelae and the association with streptococcal infection, in the event that a case is suspected. Further, this study found that independent of PANDAS, medical students endorsed agreement for interdisciplinary collaboration for associated symptom clusters. The Prevention level of the proposed model relates to the preliminary awareness preparation that a school psychologist should undergo regarding interdisciplinary collaboration as it relates to PANDAS. This preparation can be done in the form of reading the current literature, browsing dedicated websites ([www.pandasnetwork.org](http://www.pandasnetwork.org)), attending mental-health trainings, and participating in cooperative-learning experiences with medical professionals. School psychology leaders and state associations should consider cosponsoring programs, conferences, and task forces with medical professional organizations; creating mentorship networks of collaborative providers; training school psychologists in the use of medical and behavior codes (i.e., *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition), and educating students and career school psychologists about the basic tenets of the biomedical model. These considerations are important since school psychologists,

especially doctoral-level school psychologists, are not limited to working in educational settings. School psychologists who are also state-licensed psychologists may work as psychologists in varying settings outside of the school environment.

In general, the school psychologist engages in interdisciplinary collaboration with educational professionals on an ongoing basis. A fundamental task for the school psychologist is to foster a culture of universal acceptance for collaboration among all professionals with a shared interest in a child. School psychologists serve as advocates for change and, as such, can help to advocate for medical personnel to be part of interdisciplinary teams in the future. As they relate specifically to PANDAS, school-based activities for the school psychologist include inviting the child's physician to consult with the team of educational professionals, working with the other students to help them to understand what is happening with the student diagnosed with PANDAS, and offering ongoing mental-health-related trainings about such topics as OCD, tics, ADHD, and anxiety. Lastly, following the recommendation of the medical students, school psychologists should strive to be concise, decisive, and objective in their communication style with others. As such, using a behavioral collaboration approach will help to disseminate information in a clear and concise manner to other team members in a way that parallels collaboration between health care and educational professionals.

The third tier of the model, Child-Centered/PANDAS-Specific, relates directly to PANDAS and serves as a suggested responsibility flowchart for the school psychologist to use when a child is suspected of having PANDAS. The chart serves to ease the school psychologist's anxiety in relation to the guess work that occurs when working with a rare condition for the first time. Further, it serves to provide guidelines for that objective

information that might be helpful to pass along to the child's physician, referrals that might need to be made, and interventions that may need to be implemented, especially for such symptoms as anxiety and OCD..

In terms of the biological needs of the child with PANDAS/PANS, the physician is responsible for the medically related services for PANDAS/PANS, which include diagnostic testing and providing medical intervention and treatment. Several diagnostic measures have been documented in the literature, including: strep titer tests, immunological work-up, PANDAS/PANS Symptom Scale, OCD and Tic Disorder scales, and The Cunningham Panel of Tests. In terms of treatment, antibiotics, steroids, intravenous immunoglobulin, and plasmaphoresis have shown to be effective treatment options. For this study, an estimated 40% of the medical students who were surveyed felt uncertain about how to diagnose PANDAS, and 60% felt uncertain about how to treat PANDAS. If school psychologists were to encounter a suspected case of PANDAS in the future, knowledge regarding the common diagnostic tests and treatments could prove useful for effective collaboration outcomes for several reasons.

First, school psychologists would be able to suggest that the child with an abrupt onset of symptoms associated with PANDAS have a laboratory test to determine the presence of GABHS. If a throat culture is done and the end result is negative, but the symptoms persist, then the school psychologist would know that the infection could have been present several weeks prior to the throat culture, so a strep titer test may be more beneficial to use to detect signs of an earlier GABHS infection. In addition, as the treatments for PANDAS intensify, more of an intrusion on the child's education would be likely, necessitating more intervention and support planning on behalf of the school



psychologist. In turn, the school psychologist may choose to delegate certain responsibilities to other school personnel, such as a school counselor or social worker; however, the school psychologist would need to know the responsibilities that need to be delegated. Lastly, a fair majority of the medical students surveyed indicated that having knowledge of medical terminology and procedures is important for effective interdisciplinary health care collaboration; therefore, possessing knowledge of PANDAS-specific medical terminology can help to facilitate more effective interdisciplinary collaboration.

The current study also found that PCOM medical students reported inconsistent agreement in regard to receiving consistent efforts to emphasize interdisciplinary partnerships within the university. Given the coexistence between these two graduate programs (DO and School Psychology) at PCOM, this setting is optimal to establish and grow a lasting partnership between the two disciplines. As stated, this study serves as a catalyst for ongoing discussions to take place at PCOM regarding the importance of physicians and school psychologists collaborating together for shared pediatric cases. Tresolini, Shugars, and Lee (1995) offered suggestions for schools to consider to “help medical students learn an approach to patient care that integrates attention to social, psychological, and biological factors in health and illness” (p. 669). They found the following:

- 1) institutional mission and philosophy play an important role in focusing curricula on integrated care, and 2) teaching an integrated approach to care, within which a comprehensive range of influences on health can be addressed, involves attention to four relationships within medicine and medical education (i.e.

physician-patient, physician-community, physician-other practitioners, and faculty-student). (p. 669)

Curricula revision alone is not enough to reinforce integrated health care collaboration. Students from different programs at PCOM need to be provided with opportunities to interact with each other on both a social and a professional level. These activities could include shared case presentations, integrated health care committees, shadowing experiences across disciplines, social networking opportunities, and workshops, to name a few. In addition, upon graduation, PCOM could provide an alumni guide listing alumni from both programs who provide general educational consultation (school psychologist) or general medical consultation (physicians) to professionals from other programs at no cost.

### **Future Research**

As previously indicated, this study can serve as a pilot study for multiple extensions of research in the future. One of those areas is in the growing field of pediatric school psychology. Pediatric school psychology entails a balanced approach in the promotion of the health and development of children. Essentially, there are four defining features of pediatric school psychology. These include a focus on a continuum of services across varying levels of prevention and intervention, an emphasis on positive psychology, a multisystemic approach to working with children that involves building relationships across systems of care and across disciplines, and the use of a partnership-based model to promote competence and solve problems (Power & Bradley-Klug, 2013). While most professionals can identify the benefits of consultation and collaboration, effective consultation and collaboration can be difficult to achieve, partly because a unified

structure usually is lacking. This barrier is, in part, caused by the theoretical difference in approaches used for collaboration by varying individuals; therefore, pediatric school psychologists must understand the theoretical foundation of each model, as each differs in conceptualization of the consultative relationship, nature of the problem, goals, methods of intervention, and criteria used to evaluate efficacy of the collaboration (Christner et al., 2006).

Future research could expand on this pilot study by surveying school psychologists and physicians more thoroughly to construct a more detailed account of an actual “model” of interdisciplinary consultation for integrated health care collaboration between school psychologists and physicians. [Inherent in this model would be discussions concerning the specific training needs relative to both the training of physicians and the training of school psychologists in general, or as training relates specifically to PCOM.] For instance, school psychologists may need more training concerning common childhood illnesses, medication side-effects, use of the *Diagnostic and Statistical Manual of Mental Disorders (DSM)*, and intervention recommendations. Physicians may need more training on special-education law, school jargon, and ways the school psychologist could be of assistance to them.

An additional research consideration could include either qualitatively or objectively quantifying different variables to assess the difference of opinions between medical students in osteopathic versus allopathic programs in regard to specific constructs of interest regarding either PANDAS or integrated health care collaboration. Historically, DO students are trained to take a more holistic approach to health care than that taken by MD students. As such, it would be particularly interesting to further assess

for philosophical and training differences between DO and MD students as they relate to either of the two explored research areas in the current study.

Children with health impairments need physicians and psychologists to interact collegially with one another. Positive collaboration efforts allow for more comprehensive care for difficult emotional and psychosomatic problems (McDaniel, 1995) because one person can rarely attend to all relevant domains alone (Bloch, 1988). The physician can prescribe medication to treat the child's medical needs, whereas psychologists do not have the authority to prescribe medication. In return, school psychologists can help the physician pay particular attention to the psychosocial levels of a problem, can model effective problem-solving skills and relationship cultivation skills for the physician, and can offer a physician the perspective on various aspects of the child's education. Future research could continue to explore what the two professions have to offer each other by investigating beliefs, attitudes, and knowledge about different aspects of the professional disciplines of school psychology and medicine.

Lastly, several ideas were offered to increase interdisciplinary collaboration efforts within the PCOM community. Hopefully, several of these ideas will come to fruition. Over time, several new programs could be created and implemented to reinforce PCOM's mission statement, thereby leading to numerous opportunities for program development and outcomes-based research.

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## Appendix A

### *Pediatric Autoimmune Survey*

**Are you a 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, or 4<sup>th</sup> year medical student at Philadelphia College of Osteopathic Medicine?**

- Yes
- No

**Do you attend one of these programs: DO, DO/MBA Dual Degree, DO/MPH Dual Degree, DO/PhD in Health Policy Dual Degree, or DO/MS Forensic Medicine?**

- Yes
- No

*If you responded **No** to either of these questions, you are not eligible to participate in this survey, but thank you for your time and consideration.*

*Please read:*

“A first-grade boy returned to school in March after a strep-related illness and “out of the blue” began to exhibit unusual, uncontrolled vocalizations. He also twitched his head and made facial grimaces on and off throughout the day. The boy was clearly embarrassed, and tried to stifle the behaviors, which puzzled and frightened his classmates. Such tics and vocalizations commonly accompany Tourette’s syndrome, but this boy was seven years old and had never received any such diagnosis. In fact, he had never exhibited any previous vocal or motor tics. In addition, morning after morning, the child became intensely anxious, refused to get on the school bus, and had to be driven to school. He crouched in the car, sobbing and clinging to the seat. No amount of coaxing or prodding seemed to alleviate his severe yet unspecified anxiety.” The school psychologist would like to consult with this child’s pediatrician.

***What are your preliminary diagnostic impression(s)? Please list all that you would consider.***

***In this example, the child would benefit from the physician and school psychologist engaging in integrated healthcare collaboration:***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

*Please read:*

**Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal infections (PANDAS) describes a hypothesis that there exists a subset of children with **rapid onset** of obsessive-compulsive disorder (OCD) and/or tic disorders and that these symptoms are caused by group A-beta-hemolytic streptococcal (GABHS) infections. The PANDAS hypothesis suggests that an autoimmune reaction to a GABHS infection produces antibodies that continue to interfere with basal ganglia function, causing symptom exacerbations.**

**Symptom onset includes Primary ONSET of OCD and/or Tics along with at least two other following symptoms:**

- **Tics or other abnormal movements**
- **Severe separation anxiety, Generalized anxiety**
- **Irritability, Emotional lability, Aggression, Personality Changes**
- **ADHD, Inability to concentrate**
- **Sensory sensitivities**
- **Deterioration in learning abilities and school performance**
- **Developmental and age regression (including deterioration in handwriting)**
- **Sleep and night time difficulties**
- **Urinary Frequency or Daytime or night-time secondary enuresis**

***Have you ever worked with a suspected or confirmed case of PANDAS?***

- Yes
- No

***Has your medical training so far prepared you to identify a suspected case of PANDAS?***

- Yes
- No

***Have you had any specific training in interdisciplinary collaboration while a student at PCOM?***

- Yes
- No

***What would be important for a physician to use to diagnose PANDAS? (Please check all that apply)***

- Titers for a GABHS infection
- Yale-Brown Obsessive Compulsive Scale
- Yale Global Tic Severity Scale
- Verbal or written information provided from the school psychologist
- Verbal or written input from the caregiver(s)
- Biopsychosocial history from the parent or caregiver
- Developmental history from the parent or caregiver
- I am uncertain
- Other (Please Describe)

***What treatment would you recommend if you suspected PANDAS?***

- Antibiotics
- Short course of steroids like Prednisone
- IVIG
- Plasmaphoresis
- All of the above
- None of the above
- I am unsure at this point in time

Please read each statement and choose the answer that best matches your opinion.

***From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with Obsessive-compulsive disorder, tics or other abnormal movements:***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

***From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with severe separation anxiety, generalized anxiety:***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

***From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with irritability, emotional lability, aggression, personality changes:***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

***From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with ADHD, or an inability to concentrate:***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree



***From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with deterioration in learning abilities and school performance:***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

***From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with developmental and age regression (i.e. deterioration in handwriting):***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

***From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with sleep and night time difficulties:***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

***From my point of view as a DO student, I see the value in a physician and school psychologist engaging in integrated healthcare collaboration on behalf of children with urinary frequency or daytime or nighttime secondary enuresis:***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

***From a DO student's point of view, please indicate your level of agreement in the following statements:***

***I would be interested in receiving more specialized training in how to participate in effective integrated healthcare collaboration with school psychologists:***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

***I would be interested in providing consultation to a school-based multidisciplinary team in the future:***

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

***From a DO student's point of view, please identify the most preferred method for a school psychologist to contact a physician:***

- Telephone
- E-mail
- Written communication
- Schedule a face-to-face meeting
- Other: (Please specify below)

***From a DO student's point of view, please check the biggest barrier that you see to effective interdisciplinary healthcare collaboration (Please check only one):***

- Time constraints
- Protection of patient confidentiality/ Concern for HIPAA violation
- Different diagnostic references (DSM-IV-TR vs. special education law)
- Different use of terminology (school versus medical jargon) is confusing and can be frustrating for participants engaging in collaboration
- Unsure how to initiate contact with the school psychologist
- Other (Please list below)

***From a DO student's point of view, please check the one that best describes the most important asset the school psychologist needs to possess for successful integrated healthcare collaboration between physician and school psychologists:***

- Focused assessments
- Time and session efficiency
- Decisive decision making with diverse and limited data
- Flexibility
- Understanding medical conditions, procedures, and medications

Demographic Information

***What is your gender?***

- Female
- Male

***How would you classify yourself?***

- Arab
- Asian/Pacific Islander
- Black
- Caucasian/White
- Hispanic
- Indigenous or Aboriginal
- Latino
- Multiracial
- Would rather not say

***What is your year of training at PCOM?***

- 1<sup>st</sup> Year
- 2<sup>nd</sup> Year
- 3<sup>rd</sup> Year
- 4<sup>th</sup> Year

***What program do you attend at PCOM?***

- DO
- DO/MBA Dual Degree
- DO/MPH Dual Degree
- DO/PhD in Health Policy Dual Degree
- DO/MS Forensic Medicine?

***What is your intended Specialty?***

- Family Medicine
- General Internal Medicine
- General Surgery
- Internal Medicine
- Cardiology
- Obstetrics & Gynecology
- Pediatrics
- Surgery (Specialization)
- Orthopedics
- Psychiatry
- Other (Please list)

***What was your undergraduate Major?******What was your undergraduate Minor, if applicable?***

- Not applicable

***Which campus do you attend?***

- Philadelphia
- Georgia

***Prior to enrollment at PCOM, were you a resident of Pennsylvania?***

- Yes
- No

If "No," which state?

***Is someone in your family a certified school psychologist?***

- Yes
- No

If yes, who?

***Do you have an ongoing social relationship/friendship with a school psychologist?***

- Yes
- No

***Including friends and family, how many school psychologists do you know on a personal or professional level?***

- None
- 1-2
- 3-4
- 5-6
- 7 or more

## Appendix B

### Invitation to Participate

Dear PCOM DO student,

You are being asked to participate in a research study that explores several domains of interest to the responsible investigator. This survey will be used for Doctoral dissertation purposes at the Philadelphia College of Osteopathic Medicine (PCOM) by Tara Tumilty, M.S., Ed.S, NCSP. You will be asked to offer your personal opinions on various questions, as well as answer several demographic questions. This survey will take approximately 15 minutes to complete after reading this Invitation. There are minimal risks associated with this study concerning asking respondents for their opinions, which may include state anxiety at the time of response.

Your participation in this survey is completely voluntary. Your consent will be assumed if the surveys have been completed entirely and submitted either electronically. You may withdraw from the study at any time, without penalty. The results of the survey will be kept completely confidential. The data will be kept anonymous by having no personal identifying information used and the responsible investigator will have no way of identifying personal responses since the surveys were not coded. At the end of the survey, you may voluntarily participate in a drawing to win one of ten (\$25.00) *Amazon* gift cards by providing your email address, which will not be directly linked to a survey.

Thank you, in advance, for your participation. Should you have any questions, or if you would like to discuss the results, you may contact Tara Tumilty, M.S., Ed.S., NCSP at PCOM at [TaraHa@pcom.edu](mailto:TaraHa@pcom.edu). You may also contact the dissertation chair for this study, Rosemary Mennuti, Ed.D at [RosemaryMe@pcom.edu](mailto:RosemaryMe@pcom.edu) or 215-871-6414.

If you have read and understand the above statements, please click on the "Continue" button below to indicate your consent to participate in this study.

Respectfully,

TaraTumilty, M.S., Ed.S., NCSP  
(717) 272-0665  
[TaraHa@pcom.edu](mailto:TaraHa@pcom.edu)

Rosemary Mennuti, Ed.D, Dissertation Chair  
(215)-871-6414  
[RosemaryMe@pcom.edu](mailto:RosemaryMe@pcom.edu)

## Appendix C

### Invitation E-mail with Link

Dear PCOM DO Student,

I am conducting a survey for my Doctoral dissertation and your input would be appreciated. You will be asked to participate in a research study that explores several domains of interest to the responsible investigator. The survey will take approximately 15 minutes to complete. As a way to say thank you for your quick response, at the end of the survey, you will have the voluntary option to participate in a drawing **for one of ten (\$25.00) Amazon gift cards** being raffled by using your preferred email address. Your email address will not be included as part of the actual survey and we will not be able to link your survey to the email address that you provide. Here is the link to the survey:

<https://www.surveymonkey.com> ([link](#))

Thank you, in advance, for your participation.

Respectfully,

Respectfully,  
TaraTumilty, M.S., Ed.S., NCSP  
(717) 272-0665  
[TaraHa@pcom.edu](mailto:TaraHa@pcom.edu)

Rosemary Mennuti, Ed.D, Dissertation Chair  
(215)-871-6414  
[RosemaryMe@pcom.edu](mailto:RosemaryMe@pcom.edu)

### Appendix D Reminder Email

Dear PCOM medical students:

This is a friendly reminder that I am conducting a survey for my Doctoral dissertation and your input would be appreciated. The survey will take approximately 15 minutes to complete. As a way to say thank you for your quick response, at the end of the survey, you will have the voluntary option to participate in a drawing **for one of ten (\$25.00) Amazon gift cards** being raffled by using your preferred email address. Your email address will not be included as part of the actual survey and we will not be able to link your survey to the email address that you provide. Since the survey is anonymous, no identifying information will be collected. If you have already completed the survey, thank you for your assistance. If you would like to participate, please click on the following link and complete the survey by the end of the week:

Here is the link to the survey:

<https://www.surveymonkey.com> (link)

Thank you, in advance, for your participation.

Respectfully,

Respectfully,  
TaraTumilty, M.S., Ed.S., NCSP  
(717) 272-0665  
[TaraHa@pcom.edu](mailto:TaraHa@pcom.edu)

Rosemary Mennuti, Ed.D, Dissertation Chair  
(215)-871-6414  
[RosemaryMe@pcom.edu](mailto:RosemaryMe@pcom.edu)



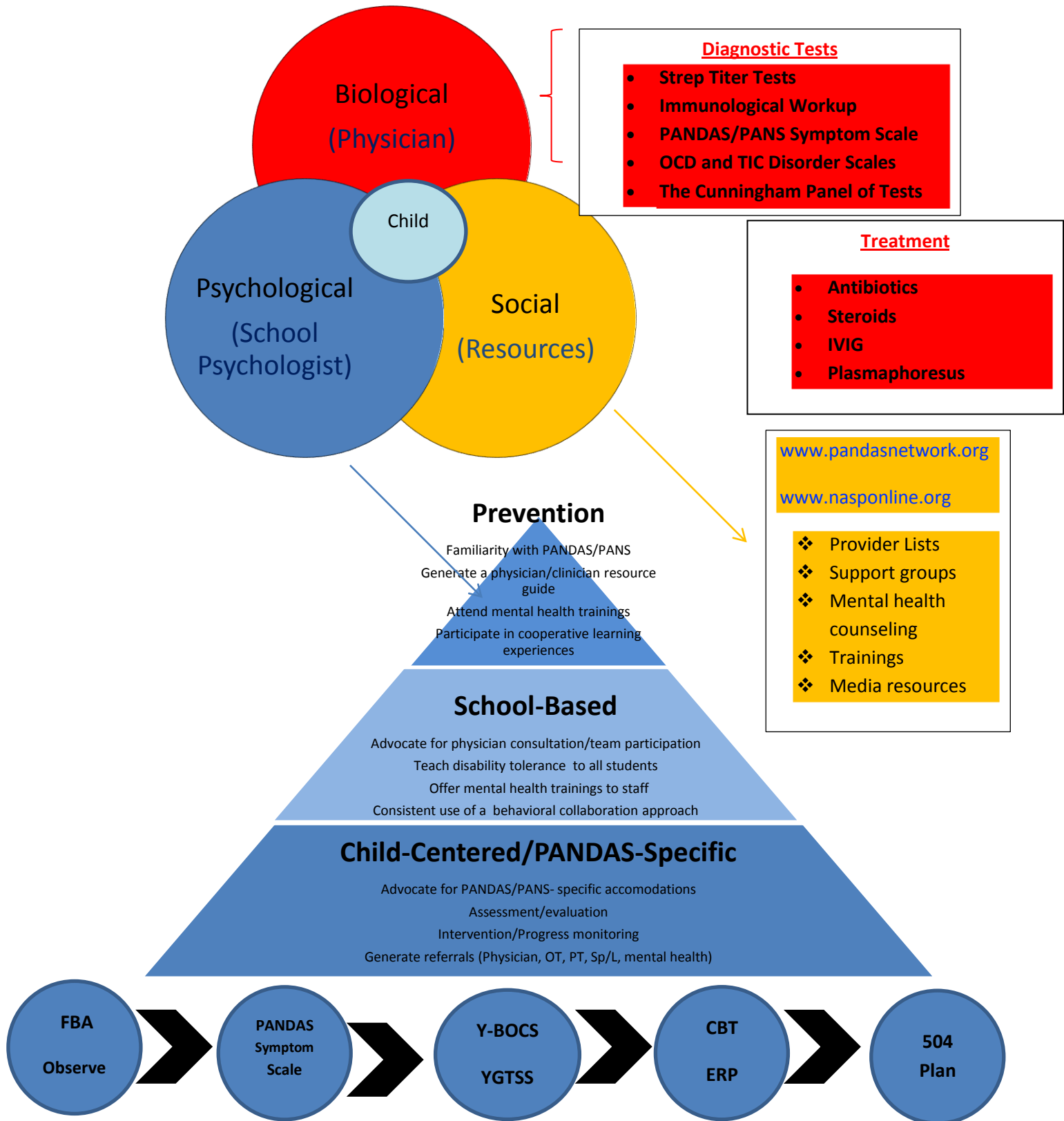


Figure 1. A working model of integrated health care collaboration and consultation for PANDAS/PANS.