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## **Increasing Knowledge of Community Autism Resources Among Pediatric Clinicians Using an Educational Intervention: A Quality Improvement Project**

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KNOWLEDGE OF AUTISM RESOURCES

Increasing Knowledge of Community Autism Resources Among  
Pediatric Clinicians Using an Educational Intervention: A Quality Improvement Project

A scholarly project presented to the Faculty of the  
Nicole Wertheim College of Nursing and Health Sciences

Florida International University

In partial fulfilment of the requirements  
For the degree of Doctor of Nursing Practice

By

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Date: \_\_\_\_\_

## KNOWLEDGE OF AUTISM RESOURCES

### **Abstract**

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by deficits of social communication, social interaction, and restrictive and/or repetitive behaviors and interests, and currently affects 1 in 54 children in the United States (Centers of Disease Control and Prevention, 2020). Presently, no cure exists for ASD; however, therapies and local resources have been utilized to aid patients with ASD and avoid delays in treatment. Early intervention has been shown to be most effective when providers have referred their patients with ASD to the appropriate resources. There are ample studies on clinician awareness of ASD diagnosis and treatment, but few studies have investigated clinicians' knowledge of treatment and community resources for ASD treatment. The purpose of this quality improvement study was to increase knowledge of community ASD resources among pediatric clinicians in Coral Gables, Florida. A quasi-experimental research design utilizing a pre- and posttest was conducted for this project. A total of  $N = 43$  subjects from a large pediatric hospital in Coral Gables, Florida participated in the study. The study was conducted remotely through a virtual educational presentation, and participants were asked to complete a pre- and post-questionnaire on Qualtrics that assessed their level of knowledge of local ASD resources in Miami-Dade County as well as their demographics, clinical and educational background, and their self-efficacy level. The study's results revealed a significant increase between the pre- and posttest on knowledge on ASD resources among all provider types increasing over time,  $t(54) = -3.03$ ,  $p = .004$ , ( $p < 0.05$ ). Pediatric clinicians should receive continuing education on local ASD resources to improve clinical practice and self-efficacy levels, and to improve overall patient outcomes.

*Keywords:* autism spectrum disorder, education, knowledge, pediatric clinicians, resources

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## **Introduction**

According to the most recent Centers of Disease Control and Prevention (2020) surveillance conducted in 2016, 1 in 54 children in the United States (US) are diagnosed with autism spectrum disorder (ASD), in comparison to the 2006 surveillance report, which found that 1 in 110 children were diagnosed with ASD. Thus, the prevalence of ASD in the US is progressively increasing (CDC, 2020). The cause of the increase is unknown, but because ASD is on the rise, attention must be focused on increasing awareness of the resources needed to assist this population.

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by deficits of social communication and social interaction, as well as restrictive and/or repetitive behaviors and interests (Simashkova et al., 2019). Presently, no cure exists for ASD; however, there are interventions that address the characteristics of the diagnosis, such as applied behavior analysis (ABA), occupational therapy, speech therapy, sensory integration therapy, and social skills therapy (CDC, 2020). These interventions are most beneficial to a patient when started at an early age; however, early referrals are usually provided from a knowledgeable physician. There is research on physicians' knowledge of ASD diagnosis and treatment, but fewer studies have investigated pediatric clinicians such as pediatricians, pediatric medical residents (PMRs), nurse practitioners (NPs), physician assistants (PAs), and ASD education on treatment and community resources.

## **Problem Statement**

### **Identification of the Problem**

Physicians have stated that a lack of education on diagnosing and treating patients with ASD during their training as a medical student and resident has led to feelings of inadequacy



when diagnosing and treating patients with ASD (Mazurek et al., 2020b). Providing education to pediatric clinicians about ASD community resources early on will prevent a delay in patient treatment and improve overall quality of care. There are ample studies on clinician awareness of ASD diagnosis and treatment, but relatively few on clinicians' knowledge of treatment and community resources for ASD treatment.

A study by Tsilimingras et al. (2018) focused on the effects of a six-hour didactic and experiential ASD education session among medical students, residents, and allied healthcare professionals. Prior to the educational session, the healthcare professionals were less knowledgeable about the importance of local community resources that aid in the treatment of ASD patients. Results from the post-questionnaire showed that, after the educational session, more participants were able to recognize ASD symptoms and gave a higher rating of importance to understanding of local resources in a rural community than in the pre-questionnaire. Research on pediatric clinicians and knowledge about community resources to aid in the treatment of ASD patients is scant.

### **Significance of the Problem**

Current research has measured and highlighted clinicians' knowledge deficits about ASD diagnosis and treatment, finding that these deficits have led to low confidence levels among providers and poor patient care. Common barriers include self-reported feelings of being unprepared, uncomfortable, and overwhelmed with diagnosing and treating patients with ASD (Havercamp et al., 2016). Studies have shown existing obstacles among providers are the lack of knowledge and access to community resources, which can delay patient treatment (James & Smith, 2020). A lack of knowledge regarding ASD diagnosis and treatment resources can

negatively affect a clinician's confidence in treating patients with ASD and potentially compromise appropriate treatment.

Havercamp et al. (2016) conducted a research study that examined the effects of educating third-year medical students on ASD; their findings showed that there had been a lack of ASD education among the third-year medical students. After conducting an educational intervention that consisted of online lectures from a pediatrician as well as a group panel discussion with individuals with ASD and their family members, the medical students reported an overall increase in ASD awareness and knowledge about financial and treatment barriers, appropriate patient care and communication techniques, and an overall higher rate of confidence in treating ASD patients.

Other medical professionals such as NPs and PAs have also reported lower rates of confidence in diagnosing and treating patients with ASD. In a study conducted by Rizzolo et al. (2020), fewer than half of the PAs surveyed reported receiving ASD education during their training. They stated that they received limited education on ASD diagnosis and treatment during their training programs, even though they reported having received adequate training on developmental milestones. The barriers that were identified among PAs regarding diagnosing and treating a patient with ASD included a lack of knowledge of screening tool administration, referrals for early intervention, and referrals for audiology. A lack of ASD education on diagnosis, treatment, and resources during training can be widely seen across all types of healthcare providers.

### **Consequences of the Problem**

A lack of knowledge on ASD community resources among pediatric clinicians can lead to a provider feeling unqualified to diagnose and treat a patient with ASD. According to James

and Smith (2020), a physician's knowledge in diagnosing ASD is only as effective as their knowledge of resource referrals. Pediatricians have reported that their lack of knowledge of ASD referral resources has hindered them from screening patients (James & Smith, 2020).

Thus, a patient's prognosis can be negatively affected by physician's lack of knowledge about community ASD resources. Consequences include a delay in treatment, which may be detrimental to a patient by hindering their development. Mazurek et al. (2020b) states that the significance of a child with ASD not receiving proper treatment could result in inadequate social skills, significant speech delays, repetitive and/or restrictive behavior that interferes with activities of daily living, and an overall poorer quality of life. If the clinical problem is not addressed, many patients with ASD will not receive timely access to proper resources that can aid in their verbal, physical, social, and cognitive development. Delaying the start of treatment can result in poor outcomes, and therapy will be less effective if its implementation is postponed. Gharedi and Watson (2019) emphasize that starting treatment prior to the age of four years old will result in a significant improvement in cognitive function.

A lack of provider knowledge of ASD resources has also led to negative parental perceptions of provider capabilities. According to Gharedi and Watson (2019), parents of children with ASD have reported a lack of confidence in the physician treating their child and an overall dissatisfaction with the provider's level of knowledge on ASD. This can cause a disconnect and distrust between the provider, patient, and/or family member which can lead to poor patient-family provider rapport, avoidance of follow-up appointments, delay in patient care, and inconsistency in patient care if the provider is changed.

### **Knowledge Gaps**

Physicians have self-reported decreased competency in assessing, diagnosing, and treating ASD due to the insufficient education and training they received in medical school, and have expressed that during their medical training, they lacked instruction in referring patients with ASD to other resources (Ghareedi & Watson, 2019). There appears to be a lack of ASD education on diagnosis, treatment, and community resources among pediatric clinicians. Newly graduated providers may not have adequate knowledge of ASD treatment, which can result in delayed referrals for therapeutic interventions. Physicians have openly expressed the need for further ASD education on how to diagnose, treat, and communicate with an ASD patient and/or their family, which will improve the overall quality of care in their practice (Havercamp et al., 2016). Provider knowledge of community resources is an essential part of treatment for ASD patients because it leads to proper referrals and early therapy.

### **Literature Review**

A literature review was conducted to identify gaps in the literature related to knowledge of ASD resources among pediatric clinicians. The search strategy was conducted through the Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and PsycINFO using the key terms *resident, physician in training, nurse practitioner, physician assistant, autism, knowledge, awareness, resources, therapies, education, and scholarship*. The search was limited to full-text articles published in peer-reviewed journals within the past five years that were written in English. Out of the search results from CINAHL ( $n = 3$ ), PubMed ( $n = 15$ ), and PsycINFO ( $n = 10$ ), a total of 3 articles were retrieved that addressed the problem, intervention, comparison, and outcome (PICO) question (see Chapter V). The search terms were expanded to include *physician, clinician, and provider*; this expanded search yielded a total of 68 articles that were retrieved from CINAHL, 73 articles from PubMed, and 79 articles from PsycINFO.

Articles with relevant concepts of ASD knowledge deficits on ASD resources and treatment among residents, physicians, nurse practitioners and physician assistants were selected. A total of 8 articles were retained that supported the knowledge gap of the PICO question. Although there is a limited amount of research among pediatric clinicians and ASD treatment and resource knowledge, the literature review identified similar knowledge gaps among physicians and other healthcare professionals.

### **Knowledge Deficits Among Medical Residents**

Tsilimingras et al. (2018) conducted a study that focused on evaluating the experience and understanding of an interprofessional educational intervention focusing on ASD diagnosis and treatment. The interprofessional six-hour didactic and experiential session was conducted among physicians, NPs, medical residents, PA students, graduate nursing students, medical students, behavior analysts, psychology-graduate students, and nursing faculty, totaling 63 participants. The study was a pre- and post- quasi-experimental design utilizing the Readiness for Interprofessional Learning Scale, a five-point Likert scale that assessed participants' views and attitudes of the interprofessional educational session, and a twelve-statement survey that assessed roles and responsibilities, interprofessional collaboration, and professional clinical practice. A positive result was seen among the participants, who reported that the interprofessional educational session increased communication, improved relationships, and supported the benefit of conducting interprofessional clinical practice. There was an overall improvement in each of the twelve-statement survey questions. Significantly, participants with less clinical experience increased their knowledge on their roles and responsibilities among ASD patients, which will enable them, as future providers, to provide quality care for their patients with ASD. Among all the participants, there was a significant increase in awareness of ASD resources in the rural

community, which may enable them to better serve their patients with appropriate referrals. An educational session would be beneficial for pediatric medical residents because they are still in training; this would increase their knowledge of local ASD resource awareness, which may lead to increased patient referrals and improvement of the overall quality of care for the patients.

Austriaco et al. (2019) performed a cross-sectional study to identify knowledge gaps in the management of a sick child with ASD. The study included 190 participants comprising medical students from the University of Alabama, as well as pediatric interns, residents, and fellows from Children's of Alabama. A 23-question survey was provided to assess the participants' general knowledge of ASD as well as their comfortability in providing treatment for a patient with ASD. Trends and associations among the participants' survey answers were analyzed using Fisher's exact test and the Wilcoxon test was used for the 1–10 scale answers. Results showed that 85% of the participants reported having “less than somewhat informed” general knowledge on ASD, and although the cohesive response indicated participants' acknowledgment of ASD daily routines and sensory issues among the participants, the majority of the participants felt uncomfortable treating a sick patient with ASD. Significantly, 91.4% of the participants reported that they did not receive adequate education on treatment of sick children with ASD, and 92.6% supported the need for ASD education on treatment of patients with ASD. The study results highlight the lack of ASD education regarding treatment among pediatric medical residents and support the need for an educational intervention.

An ASD knowledge deficit has been reported among medical residents in other countries, indicating that this particular shortcoming is not unique to medical training in the US. Hidiroglu et al. (2018) conducted a cross-sectional study that measured ASD knowledge among medical residents in a research and training hospital in Istanbul, Turkey; the Knowledge About

Childhood Autism Questionnaire was administered to assess the residents' general knowledge of ASD behaviors and characteristics. A chi-square test and Fisher's chi-square test were used to analyze results and compare associations between the neuropsychiatric medical residents and medical residents of other specialties. The significant difference in the results was that the neuropsychiatric residents had acquired ASD knowledge that the remaining residents had not, such as identifying ASD symptomatology and associated disorders. The specialties of other medical residents who had not acquired as much ASD knowledge as the neuropsychiatric residents included pediatrics and family medicine, highlighting a potential knowledge gap among primary care providers. Because primary care physicians consistently follow patients throughout their early development, they should be well versed in ASD characteristics.

Neuropsychiatric specialties tend to receive more ASD education, which better prepares them to treat and manage patients with ASD. The lack of ASD training among pediatric and family medical residents may impair their ability to adequately diagnose and treat ASD patients. The authors suggested that it would be beneficial to increase ASD diagnostic and treatment education among medical residents. Furthermore, general knowledge of ASD characteristics may help medical residents become more knowledgeable physicians who will be competent in diagnosing and treating ASD patients. The study by Hidiroglu et al. (2018) supports the need for further training and education on ASD symptom characteristics among medical residents, and the authors of that study recommended that medical residents of other disciplines be included in the same ASD training as the neuropsychiatric medical residents to promote early diagnosis and treatment of such patients.

The lack of knowledge of ASD diagnosis and management is prevalent among medical residents. Knowledge gaps during medical residency can carry over into future clinical practice

and can affect the quality of patient care. Addressing the knowledge gaps during residency may help to improve early ASD diagnosis and treatment among patients.

### **Knowledge Deficits Among Primary Care Providers**

Educational interventions have been used to further expand primary care providers' (PCPs) knowledge on ASD diagnosis and treatment options. A study by Mazurek et al. (2020a) investigated the effects of a technology-based model known as the Extension for Community Health Outcomes (ECHO) to see whether it improved the overall clinical practice, self-efficacy, and knowledge of ASD among PCPs. One hundred forty-eight PCPs—comprising of family practice physicians, pediatricians, NPs, and PAs—participated in the ECHO training model, which consisted of a biweekly two-hour teleconference and three in-person training visits at ASD clinics. A stepped wedge randomized clinical trial study was conducted wherein five separate cohorts of PCPs were followed throughout a six-month window over two years and analyzed every three months. Results showed that with the ECHO model, PCPs' knowledge of ASD and self-efficacy increased, and perceptions of ASD barriers decreased. Educational models like ECHO have increased PCPs' knowledge of ASD diagnostic and treatment requirements. The effects of improved ASD knowledge and higher self-efficacy among PCPs can lead to higher quality patient care.

Mazurek et al. (2020b) conducted a secondary mixed-method study that evaluated 114 PCPs' perceptions of ASD barriers prior to an ASD training program. Out of the 114 PCPs, 95 were physicians, 15 NPs, 2 PAs, and 2 other healthcare providers. The purpose of the study was to identify existing barriers among PCPs regarding ASD treatment. This was accomplished through a survey identifying the PCPs' perceived barriers and an open-ended question that addressed potential areas of improvement in ASD patient care. Responses were coded and



analyzed to identify the main barriers among the providers. Results showed that 85% reported a lack of confidence in managing associated behaviors, 85% reported insufficient time spent with an ASD patient in an appointment, and 81% reported a lack of knowledge about ASD resources. More than half of the PCPs reported that they would benefit from more training on ASD diagnosis and treatment. They specifically identified the need to increase their knowledge of effective treatments for associated behaviors as well as awareness of available community resources. Study results emphasize that PCPs lack knowledge that is vital in creating an adequate treatment plan for the ASD patient. If provided, the needed ASD treatment education, especially in local resources, can increase the likelihood of proper referrals. The lack of knowledge about local ASD resources among physicians can delay patient treatment, which can hinder the patient's progress and result in untreated behaviors (James & Smith, 2020). This study supports the need for an educational intervention that increases awareness of ASD community resources so that providers can promptly refer their patients for appropriate treatment, and for continuing medical education among physicians, NPs, and PAs who treat patients with ASD to improve the quality of care.

Rizzolo et al. (2019) conducted a two-survey study; one survey evaluated 213 PAs' knowledge of ASD diagnosis and treatment, and the second survey evaluated their self-perceived educational needs. The first survey contained a basic yes-or-no questionnaire that evaluated the PAs' general ASD knowledge of patient care, and a Likert scale to assess areas of ASD knowledge deficiency that warranted further education. The results of the first survey showed that although most of the PAs reported receiving education on pediatric developmental milestones in their PA training program, only 37.3% received education on clinical signs and symptoms of ASD, 18.5% received education on how to provide treatment for ASD patients, and

12.8% received education on how to administer the Modified Checklist for Autism in Toddlers (M-CHAT). The second survey (i.e., of PA educational needs) had significant findings of low to average ASD knowledge, abilities, and skills among PAs in comparison to their desired level of knowledge. PAs reported having lower-than-average ASD knowledge and understanding of screening tools. They reported having low to average knowledge in community referrals that included audiology, therapies, and other specialty services.

Healthcare providers who are in contact with patients, especially in primary care settings, should be equipped with the proper knowledge on how to screen, diagnose and treat patients with ASD to provide quality care. The recognition of ASD characteristics combined with the ability to administer screening tools can result in early diagnosis. Knowledge of proper referrals to local resources can lead to early intervention and treatment. Overall, adequate diagnostic and treatment knowledge among primary care providers is essential to provide quality care for ASD patients.

### **Knowledge Deficits and Self-Efficacy Levels**

A provider's perspective on their self-evaluated level of knowledge on ASD diagnosis and treatment may diverge from their actual level of knowledge, as seen in a study by Ghaderi and Watson (2019). Twenty-seven physicians from Ontario participated in a mixed-method study that evaluated their perceptions of their level of ASD diagnosis and treatment knowledge through a 19-question, four-point Likert scale questionnaire and a semi-structured interview. The data was coded and analyzed through the Statistical Package for the Social Sciences (SPSS) by analysis of variance, paired-sample *t*-test, and correlational analysis. The results showed that the physicians' rated their perceived knowledge level of ASD diagnosis and treatment higher on the questionnaires than the actual level that was revealed during the interview. When questioned,

some physicians openly admitted their lack of expertise on ASD diagnostic procedures, treatment options, and resource referrals. The significance of the results highlights the discrepancy between primary care physicians' perceptions of their own capabilities of diagnosing and caring for a patient with ASD and their assessed competency level. A PCP may rate their self-efficacy level higher than their actual level of ASD knowledge, which can lead to mismanagement of an ASD patient. A missed diagnosis or the lack of proper referrals reflects poor quality care. An ASD patient who never receives treatment may have an overall poorer quality of life. Therefore, continuing ASD diagnostic and treatment education among PCPs is important to improve the quality of care for ASD patients.

Unigwe et al. (2017) conducted a similar study that assessed the perceived self-efficacy of general practitioners (GPs), known as "primary care physicians" in the United Kingdom, when treating ASD patients. The study involved 304 GPs who participated in the mixed-method study that utilized the Knowledge of Autism Scale to assess their general knowledge of ASD. A 14-item self-efficacy questionnaire was provided to rate the GPs' confidence in identifying and managing ASD patients on a 1–10 scale, and they were also provided with an open-ended question that addressed their personal experiences with ASD patients. Study results showed that roughly half of the GPs were unaware that ASD could be diagnosed before the age of three and that decreased responses among children to their names is an early sign of ASD. Although the majority of GPs had an overall high level of ASD knowledge, the average level of self-efficacy of diagnosing and treating ASD patients was rated 4.8 out of 10. When questioned, approximately two-thirds responded that they never received ASD training on diagnosis and treatment during medical school or during their residency of GP training, and another two-thirds reported not receiving ASD training since gaining their GP qualifications. A staggering 39.5%

reported a total lack of ASD diagnostic and treatment education during medical school, residency, and as a practicing physician. The lack of continuing ASD education during GPs' medical careers resulted in low self-efficacy rates in areas of ASD diagnostic criteria that are important in early screening and diagnosis. Because half of the GPs were unaware that ASD could be diagnosed prior to the age of three, their patients may have been receiving delayed diagnoses and treatment, which can be detrimental to their development. Increasing ASD diagnostic and treatment education among GPs can increase their knowledge about the condition, which can improve self-efficacy levels, and therefore improve patient care.

### **Summary of the Literature**

Providers who lack adequate knowledge of ASD diagnosis and treatment have lower levels of confidence in treating patients with ASD, which can affect the quality of care (Havercamp et al., 2016). Low levels of self-efficacy can lead to a missed diagnosis or incorrect treatment referral for ASD patients. Enhancing ASD education among pediatric clinicians can equip them with the knowledge to recognize ASD characteristics and screen patients appropriately. This, in turn, can increase the provider's confidence in diagnosing and managing patients with ASD. Early detection and diagnosis of ASD can prevent delayed referrals and treatment, which may result in a better overall quality of care.

A lack of ASD diagnosis and treatment stems from deficits of ASD education during a physician's medical school or residency training (Austriaco et al., 2019; Hidiroglu et al., 2018; Tsilimingras et al., 2018; Unigwe et al., 2017), and ASD diagnostic and treatment education varies among medical residents of different subspecialties (Hidiroglu et al., 2018). Medical residents in neuropsychiatric specialties have reported higher levels of ASD knowledge than pediatric and family medical residents, even though primary care physicians spend more time

with their patients, and as such are well-positioned to detect ASD during a patient's early years of development, given the proper knowledge.

ASD diagnostic and treatment education should be equivalent across all subspecialties of medical residency to adequately prepare physicians to diagnose and treat ASD patients.

Similarly, Rizzolo et al. (2019) recommend the implementation of ASD diagnosis and treatment education among PA programs' curricula to bridge the knowledge gap to ensure that PAs are providing optimal care to ASD patients. Optimizing ASD diagnostic and treatment education among medical residents may increase self-efficacy, promote early diagnosis and treatment, and increase quality of care for ASD patients.

### **PICO Question/Purpose**

An essential part of being a qualified healthcare provider is the knowledge and ability to identify, diagnose and treat autism spectrum disorder (ASD) within the patient population (Simashkova et al., 2019). Treatment of ASD includes knowledge of the local resources available for proper referrals to treat ASD patients, depending on their individual needs. Currently, pediatric clinicians are not receiving formal training on the local ASD resources available for patients in Miami-Dade County. This ASD knowledge deficit places the providers—as well as their patients—at a disadvantage because it may defer referrals and delay treatment. The consequences of delayed treatment among ASD patients include non-advancement in speech, inadequate social skills, and continuation of repetitive and/or restrictive behaviors that affect their quality of life (Mazurek et al., 2020).

From the knowledge gaps identified through the literature search, the following research question was created: *Will the implementation of an educational intervention (I) increase the knowledge of community autism resources (O) among pediatric clinicians (P)?*

This quality improvement project focused on educating pediatric clinicians on local community resources available for pediatric patients with ASD. Educating pediatric clinicians on community ASD resources can increase their knowledge base about the condition, promote timely screening and diagnosis, increase physician confidence, and improve overall quality of care for the patient. The educational intervention and discussion session conducted by Tsilimingras et al. (2018) showed a positive change among healthcare providers with regards to recognizing ASD characteristics and understanding the importance of community ASD resources. Education on community ASD resources may enhance provider awareness and confidence, thereby increasing appropriate referrals of patients to community ASD resources.

### **Goals/Objectives**

The following goals and objectives have been identified to address the pediatric clinicians' knowledge gap of local ASD resources. The listed goals and outcomes are specific, measurable, achievable, relevant, time-bound, and aligned with the pediatric hospital's mission to educate providers in pediatric patient care. The goals of this project were to:

1. Assess the knowledge of pediatric clinicians with Likert-scale questionnaires before and after the educational intervention.
2. Increase the level of knowledge of local ASD resources among pediatric clinicians via a 30-minute virtual PowerPoint presentation conducted through a video conferencing platform, which will outline local ASD resources and their purposes.

3. Reinforce the information included within the presentation by providing the clinicians with an informative pamphlet that can be downloaded as an additional resource and can be easily accessed for future reference.
4. Enhance the quality of treatment for ASD patients and early referral to appropriate services by increasing providers' level of awareness of local ASD resources.

### **Definition of Terms**

The following terminology is used throughout the paper. For the purposes of facilitating reader literacy, the following terms have been defined.

*Residents* are defined as “physicians serving a residency” by Merriam-Webster (n.d.).

The term *pediatric medical residents* (PMRs) refer to physicians serving a residency who are specializing in the pediatric population.

*Physician assistants (PAs)* are medical professionals who are able to diagnose, treat, and manage patients of all ages as well as prescribe medication (AAPA, n.d.). PAs work collaboratively with physicians in healthcare settings.

*Primary care providers (PCPs)* are defined as medical professionals such as physicians, NPs, or PAs, who render primary care services for patients (AAFP, n.d.). PCPs focus on health promotion, disease prevention, diagnosis and treatment of acute and chronic illnesses, and health maintenance.

*Statistical Package for the Social Sciences (SPSS)* is a statistical software platform developed by IBM (n.d.) and used to help analyze numeric data.

### **Theoretical Framework**

Pettigrew and Whipp's Model of Strategic Management of Change is a theoretical framework that involves three dimensions of strategic change: context, content, and process (White et al., 2021). The importance of the framework is the continuous interaction between the context, content, and process of change, which has been frequently used in organizations that are implementing and analyzing program change (Bramberg et al., 2015). The *context* is the internal and external factors that are the reason for the change—essentially, the *why*. When analyzing the large pediatric hospital, it became clear that it does not offer their pediatric clinicians additional information or education on local ASD resources in Miami-Dade County. Associating the lack of ASD resource knowledge with the potential for missed medical referrals led this author to the conclusion that change is needed to improve pediatric clinicians' knowledge of local ASD resources, and thereby improve patient care. The *content* is *what* has to be done to create change. The content would be to first highlight the lack of ASD local resource knowledge among the pediatric clinicians at the large pediatric hospital, showcasing the need to further educate them on the subject matter, i.e., available local resources for the diagnosis and treatment of ASD. The *process* is the *how* of change, which outlines methods, strategies, actions, and interventions that will be used to create the sought-after change—in this case, creating and delivering an educational presentation and informational pamphlet on local ASD resources for pediatric clinicians. The process also highlights the immediate and long-term effects of the intervention (Bramberg et al., 2015). The completion of the process showcased the results of an educational intervention that can facilitate change in the educational system at the pediatric hospital, focusing on pediatric clinicians' knowledge of local ASD resources.

### **Methodology**



**a. Study Design**

The project followed a quasi-experimental research design. Data collection for this study consisted of a pre-and posttest to assess the pediatric clinicians' level of knowledge of local ASD resources such as therapies, schools, and scholarships before and after an educational session. The pre-questionnaire allowed the DNP scholar to assess the provider's level of ASD resource knowledge, and the post-questionnaire aided the DNP scholar in assessing the provider's level of knowledge of ASD therapies, schools, and scholarships in Miami-Dade County before and after an educational session. Comparing the results of the pre- and post-questionnaires provided information regarding the effects of the educational intervention on pediatric clinician's knowledge of local ASD resources.

**b. Setting and Sample**

The setting was a large pediatric hospital located in Miami-Dade County, Florida. The large pediatric hospital offers a three-year accredited pediatric residency training program that accepts up to 84 medical residents yearly. The program prepares medical residents to qualify as primary care pediatricians and supports their advancement toward pediatric subspecialties. According to the hospital, 25% of their graduate PMRs practice primary care.

There are currently 86 PMRs in the large pediatric hospital, comprising 28 first-year, 28 second-year, and 28 third-year PMRs, as well as two chief residents. The pediatric hospital currently has more than 800 practicing pediatric physicians and altogether has more than 30 practicing NPs and PAs. The pediatric hospital offers continuing education for allied professionals, up-to-date educational and research seminars, and monthly council meetings.

The inclusion criteria are participants registered as physicians, medical residents, nurse practitioners, physician assistants that are affiliated with the pediatric hospital. The exclusion criteria would be other healthcare providers who are not physicians, medical residents, nurse practitioner or physician assistants who are practicing at the pediatric hospital.

### **c. Intervention and Instruments**

The DNP scholar conducted an education intervention via teleconference, utilizing a 30-minute PowerPoint presentation delivered via video conferencing platform during medical and nursing rounds. Medical and nursing rounds consist of an educational presentation that discusses select pediatric topics that are offered for healthcare professionals at the large pediatric hospital. Pediatric clinicians were encouraged to attend the presentation to further their knowledge of evidence-based practice in pediatric care. Currently, medical and nursing rounds are conducted via a video conferencing platform that allows multiple users to listen and participate in an online conference. Participants were sent the recruitment email, to which the consent form was attached, containing a link to the pre-questionnaire. Participants were asked to complete a demographic questionnaire, an educational and clinical experience questionnaire, and a Likert-scale questionnaire on their level of knowledge of local ASD resources, as well as a self-efficacy questionnaire. The pre- and post-questionnaires were developed on Qualtrics and contained seven demographic questions, eight questions on educational background and clinical background, thirteen five-point Likert scale questions on provider knowledge, and seven five-point Likert scale questions on self-efficacy. The pre-questionnaire was accessible starting two weeks prior to the presentation date. A 30-minute presentation was provided via a video conferencing platform to educate the pediatric clinicians on the different types of local ASD resources and their purposes. An informational pamphlet was available for download after the

presentation was delivered; it contains a list of local resources and updated contact information, and it intended to function as an additional resource for pediatric clinicians. The presentation and pamphlet described local ASD resources such as physical therapy, occupational therapy, speech therapy, applied behavior analysis therapy, Parent to Parent, CARD, Early Steps, FDLRS, and scholarships available for ASD patients. Following the presentation, the participants were able to ask questions, and they were then emailed a link to the Qualtrics post-questionnaire that assessed the knowledge they had gained from the educational intervention. At the conclusion of the presentation, the pediatric clinicians should have been able to identify local ASD resources used for ASD treatment and describe the purpose of each resource.

#### **d. Data Collection**

The pre-questionnaire was emailed two weeks prior to the date of the presentation, and the pediatrician clinicians had until the start of the presentation to complete it. Once the presentation concluded, a post-questionnaire was available via an emailed link. The participants had up to a week following the conclusion of the presentation to complete the post-questionnaire.

#### **e. Data Analysis**

Each question on both the pre- and post-questionnaires measured participants' self-perceived level of knowledge of each local ASD resource in Miami-Dade County on a five-point Likert scale with 1 being "strongly disagree," 2 being "somewhat disagree," 3 being "neither agree nor disagree," 4 being "somewhat agree," and 5 being "strongly agree" The self-efficacy questionnaire was coded in the same manner. The educational and clinical experience "yes/no" answers were coded 0 "no" and 1 "yes." The ordinal data was converted into numbers, treated as interval data, and analyzed using the independent samples *t*-test through SPSS statistics.

Demographic variables were analyzed for pretest and posttest using frequency counts and percentages. The type of education or training and practice experience were also analyzed for pretest and posttest using frequency counts and percentages. Scales measuring knowledge and self-efficacy were collected at both pretest and posttest using a five-point Likert scale. Total knowledge and total self-efficacy scores were calculated for both pretest and posttest. Responses to individual items for both pretest and posttest were examined as were total knowledge and self-efficacy scores. Because the data were not paired, differences between pretest and posttest scores for both knowledge and self-efficacy scores were analyzed using an independent samples *t*-test. In addition, a mixed ANOVA was used to determine whether the change from pre- to post- on both knowledge and self-efficacy differed based on provider type (medical resident, nurse practitioner, or other).

#### **f. Protection of Human Subjects**

The protection of human subjects was established through Florida International University (FIU) Institutional Review Board (IRB) approval. There was a low risk in participation because results were not released to the administrative body in the pediatric hospital and questionnaire submissions were anonymous via Qualtrics.

### **Results**

The quality improvement project was conducted over a six-week period from September 17<sup>th</sup>, 2021 to October 27<sup>th</sup>, 2021. The pediatric clinicians were given two weeks prior to the first presentation date to complete the Qualtrics pre-questionnaire and a week after the last presentation date to complete the post-questionnaire. A total of  $N = 43$  pediatric clinicians

participated in the pre-questionnaire and a total of  $N = 29$  pediatric clinicians participated in the post-questionnaire.

### a. Demographics

A total of 43 respondents completed the pretest and 29 completed the posttest. The demographic characteristics for the sample that completed the pretest and the posttest are reported in Table 1. The sample was predominantly female (81% for pretest and 93% for posttest) and White (81% for pretest and 83% for posttest). At the pretest, 42% of the sample were medical residents, 33% were nurse practitioners, and 23% were other. At the posttest, 24% were medical residents, 35% were nurse practitioners, and 41% were other.

Table 1

*Pre- and Post-Questionnaire Demographic Variables Among Pediatric Clinicians at a Large Pediatric Hospital in Coral Gables, Florida (N = 43)*

Characteristic	Pretest		Posttest	
	N	%	N	%
<b>Gender</b>				
Female	35	81	27	93
Male	8	19	2	7
<b>Age</b>				
20–29	14	33	6	21
30–39	18	42	7	24
40–49	1	2	2	7
50–59	7	16	10	35
> 60	3	7	4	14
<b>Race</b>				
White	35	81	24	83
Black/African American	1	2	4	14
Asian	3	7	1	3
Prefer not to respond	4	9	-	-
<b>Position</b>				
Medical resident	18	42	7	24
1 <sup>st</sup> year	6	14	-	-
2 <sup>nd</sup> year	9	21	5	17
3 <sup>rd</sup> year	3	7	7	24

Attending	1	2	-	-
Nurse practitioner	14	33	10	35
Other	10	23	12	41
Years of experience <sup>a</sup>				
Less than 1 year	2	5	-	-
1–5 years	3	7	1	3
5–10 years	4	9	2	7
10–15 years	1	2	7	24
15+ years	5	12	7	24

<sup>a</sup> For attendings, nurse practitioners, or physician assistants only

**b. Training and Clinical Experience**

Respondents were asked about the type of education or training received and their practice experience in both the pretest and the posttest (see Table 2). In the pretest, the most commonly reported types of education or training were for diagnosis of ASD (51%), Early Steps Program (54%), and treatment of ASD (42%). The least common type of education or training reported at the pretest was for scholarships or grants for patients with ASD (5%). In the posttest, the percent of respondents who endorsed all types of education or training increased.

When asked about practice experience in pretest, close to half of the respondents indicated using a screening tool for ASD (49%), 44% indicated that they referred a patient with ASD to any therapy, and 35% indicated that they referred a patient to Early Steps. In the posttest, most percentages either remained unchanged or decreased.

Table 2

*Pre- and Post-Questionnaire Comparison of Educational/Training and Practice Experience Among Pediatric Clinicians at a Large Pediatric Hospital in Coral Gables, Florida (N = 43)*

<b>Type of Education or Training</b>	Pre		Post	
	<i>N</i>	%	<i>N</i>	%
Diagnosis of ASD	22	51	19	70
Treatment for ASD	18	42	18	62

Early Steps program	21	54	20	69
FDLRS program	5	12	14	48
Scholarships or grants for patients with ASD	2	5	14	48
Educational programs and schools	7	16	15	52
Center for Autism and Related Diseases	5	12	16	55
Parent to Parent	5	12	15	52
<b>Practice Experience</b>				
Utilized a screening tool for ASD	21	49	9	31
Diagnosed a patient with ASD	8	19	6	21
Referred a patient with ASD to any therapy	19	44	11	38
Referred a patient to Early Steps	15	35	8	28
Referred a patient with ASD to FDLRS	3	7	3	10
Discussed any ASD program/schools with patient or parent	6	14	6	21
Discussed any scholarship/grant with patient or parent	1	2	2	7
Discussed any type of parental resource for parents	4	9	4	14

**c. Knowledge Change from Pretest to Posttest**

Item-level responses for knowledge at both pretest and posttest are presented in Table 3.

Table 3

*Pre- and Post-Questionnaire Levels of Knowledge of Autism Resources Among Pediatric Clinicians at a Large Pediatric Hospital in Coral Gables, Florida (N = 43)*

Item	Pre					Post				
	Strongly disagree N (%)	Somewhat disagree N (%)	Neither agree nor disagree N (%)	Somewhat Agree N (%)	Strongly Agree N (%)	Strongly disagree N (%)	Somewhat disagree N (%)	Neither agree nor disagree N (%)	Some what Agree N (%)	Strongly Agree N (%)
I am very familiar with signs and symptoms of autism spectrum disorder (ASD)	-	2 (5)	3 (7)	19 (44)	10 (23)	-	1 (3)	1 (3)	10 (35)	10 (35)
I have the necessary skills to properly administer and score screening tools for ASD	4 (9)	4 (9)	8 (19)	10 (23)	8 (19)	2 (7)	4 (14)	5 (17)	7 (24)	4 (14)

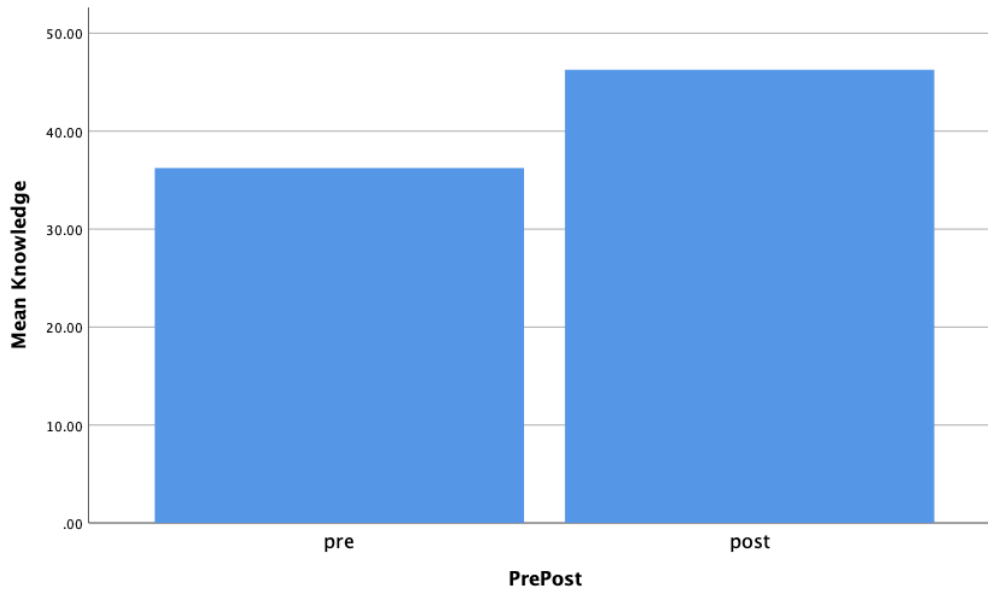
I have the necessary skills to properly diagnose a patient with ASD	4 (9)	4 (9)	9 (21)	12 (28)	5 (12)	4 (14)	2 (7)	5 (17)	8 (28)	3 (10)
I am very knowledgeable in the different types of treatment options for ASD	4 (9)	9 (21)	12 (28)	7 (16)	2 (5)	2 (7)	4 (14)	3 (10)	8 (28)	5 (17)
I am very familiar with speech therapy and ASD patients	4 (9)	6 (14)	4 (9)	16 (37)	4 (9)	1 (3)	3 (10)	5 (17)	7 (24)	6 (21)
I am very familiar with occupational therapy for ASD patients	5 (12)	8 (19)	1 (2)	16 (37)	4 (9)	1 (3)	3 (10)	5 (17)	7 (24)	6 (21)
I am very familiar with ABA therapy for ASD patients	7 (16)	5 (12)	5 (12)	10 (23)	7 (16)	3 (10)	1 (3)	4 (14)	8 (28)	6 (21)
I am very knowledgeable on ASD educational program/schools	11 (26)	11 (26)	6 (14)	5 (12)	1 (2)	1 (3)	3 (10)	5 (17)	9 (31)	4 (14)
I am very knowledgeable on scholarships and grants available for patients with autism	18 (42)	9 (21)	4 (9)	2 (5)	1 (2)	3 (10)	4 (14)	3 (10)	7 (24)	5 (17)
I am very familiar with the Early Steps Program	3 (7)	10 (23)	7 (16)	11 (26)	4 (7)	1 (3)	2 (7)	3 (10)	10 (35)	6 (21)
I am very familiar with the FDLRS program	12 (28)	9 (21)	6 (14)	6 (14)	1 (2)	1 (3)	4 (14)	3 (10)	9 (31)	5 (17)
I am very familiar with CARD	17 (40)	9 (21)	4 (9)	3 (7)	1 (2)	1 (3)	6 (21)	2 (7)	8 (28)	5 (17)
I am very familiar with Parent to Parent	20 (47)	7 (16)	2 (5)	4 (9)	1 (2)	1 (3)	7 (24)	1 (3)	8 (28)	5 (17)



In addition, statistical tests revealed a statistically significant difference between pretest and posttest scores, with knowledge scores increasing over time,  $t(54) = -3.03, p = .004$ . The magnitude and direction of this effect are displayed in Figure 1.

Figure 1

*Change in Mean Difference of Knowledge Level*



When examining whether the change in knowledge differed among medical residents, nurse practitioners, or other providers, the main effect of position was not statistically significant ( $F(2, 50) = 2.19, p = .123$ ). In addition, there was interaction between position and knowledge change, indicating that the change in knowledge between pre- and posttest was the same for all types of providers ( $F(2, 50) = 0.13, p = .881$ ).

In addition to change in overall knowledge, item-level responses were analyzed to determine the effectiveness of the intervention on specific aspects. Significant changes were found for being “very knowledgeable” in the different types of treatment options ( $p = .049$ ), being “very knowledgeable” on ASD educational programs/schools in Miami Dade County ( $p <$

.001), being “very knowledgeable” on scholarships and grants available for patients with ASD ( $p < .001$ ), being “very familiar” with the Early Steps program ( $p < .013$ ), being “very familiar” with the FDLRS program ( $p < .001$ ), being “very familiar” with CARD ( $p < .001$ ), and being “very familiar” with Parent to Parent ( $p < .001$ ). Significant change between pre- and posttests were not found for being “very familiar” with any type of therapy including speech therapy ( $p = .335$ ), occupational therapy ( $p = .226$ ), or ABA therapy ( $p = .277$ ).

**d. Self-Efficacy Change from Pretest to Posttest**

Item level responses for self-efficacy at both pretest and posttest are presented in Table 4. In addition, statistical tests revealed a statistically significant difference between pretest and posttest scores, with self-efficacy scores increasing over time,  $t(52) = -2.36, p = .022$ . The magnitude and direction of this effect are displayed in Figure 2.

Table 4

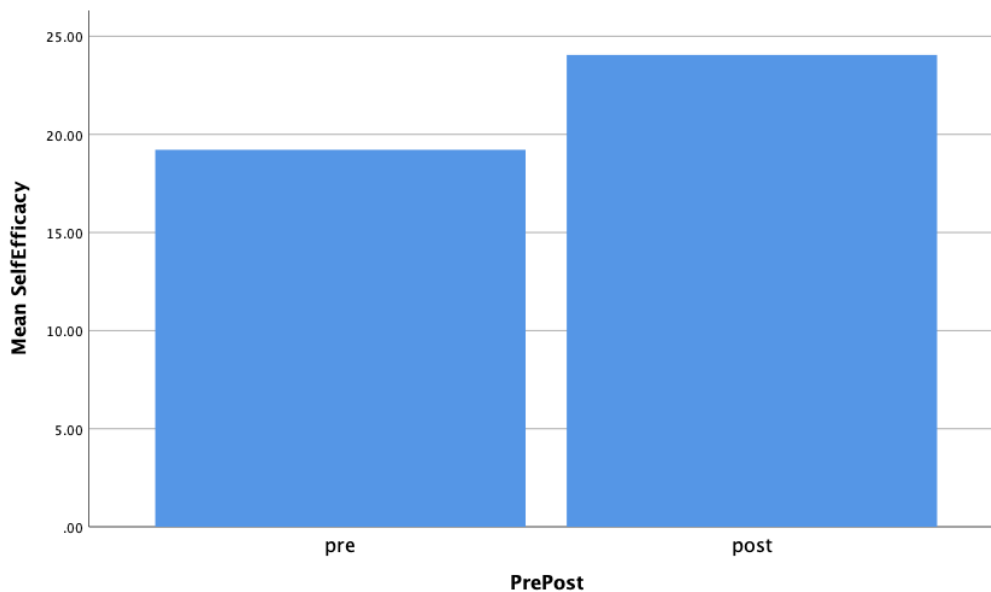
*Pre- and Post-Questionnaire Self-Efficacy Level of Autism Resources Among Pediatric Clinicians at a Large Pediatric Hospital in Coral Gables, Florida (N = 43)*

Item	Pre						Post			
	Strongly disagree N (%)	Somewhat disagree N (%)	Neither agree nor disagree N (%)	Somewhat Agree N (%)	Strongly Agree N (%)	Strongly disagree N (%)	Somewhat disagree N (%)	Neither agree nor disagree N (%)	Some what Agree N (%)	Strongly Agree N (%)
I am confident in my knowledge of autism spectrum disorder (ASD)	1 (2)	7 (16)	5 (12)	13 (30)	7 (16)	4 (14)	-	2 (7)	8 (28)	7 (24)
I am comfortable administering and scoring screening tools for ASD	6 (14)	7 (16)	4 (9)	10 (23)	6 (14)	2 (7)	2 (7)	9 (31)	4 (14)	4 (14)
I am comfortable diagnosing a	8 (19)	5 (12)	8 (19)	10 (23)	2 (5)	3 (10)	2 (7)	7 (24)	5 (17)	4 (14)

patient with ASD										
I am confident referring a patient with ASD to the proper treatment options	5 (12)	7 (16)	6 (14)	12 (28)	3 (7)	1 (3)	2 (7)	5 (17)	9 (31)	4 (14)
I am confident in discussing local educational programs and schools for ASD	8 (19)	13 (30)	5 (12)	6 (14)	1 (2)	1 (3)	4 (14)	6 (21)	6 (21)	4 (14)
I am confident discussing different types of scholarships and grants for ASD patients	11 (26)	11 (26)	7 (16)	3 (7)	1 (2)	2 (7)	4 (14)	7 (24)	3 (10)	5 (17)
I am confident discussing local parental resources for parents of children with ASD	11 (25)	10 (23)	6 (14)	5 (12)	1 (2)	2 (7)	3 (10)	5 (17)	6 (21)	5 (17)

Figure 2

*Change in Mean Difference of Self-Efficacy Level*



When examining whether change in self-efficacy differed based on provider type, there was no significant main effect of provider type ( $F(2, 48) = 1.79, p = .179$ ). In addition, the interaction between provider type and change in self-efficacy was also found to be insignificant, indicating that the change in self-efficacy was the same for all provider types ( $F(2, 48) = 1.79, p = .742$ ).

In addition to the change in overall self-efficacy, item-level responses were analyzed to determine the effectiveness of the intervention on specific areas of self-efficacy. Significant changes were found for being confident discussing local educational programs and schools for ASD ( $p = .003$ ), being confident discussing different types of scholarships and grants ( $p = .003$ ), confidence discussing local parental resources for parents of children with ASD ( $p = .002$ ). No change in confidence regarding referring a patient with ASD to the proper treatment options was reported ( $p = .097$ ).

### **Discussion**

The results from the quality improvement project revealed that there was an increase in knowledge on community ASD resources among pediatric clinicians after receiving an educational intervention. Along with the increase in knowledge levels, the educational intervention also improved the providers' self-efficacy levels. Havercamp et al. (2016) conducted a research study that examined the effects of educating third-year medical students on ASD. Their study consisted of an educational intervention delivered through online lectures and group panel discussions with individuals with ASD and family members. At the conclusion of the study, 85.8% of the medical students reported a positive change in knowledge of examination and communication with ASD patients, 74.7% reported a positive change of confidence and comfort level in treating ASD patients, and 85.9% reported feeling able to provide better care

after the intervention. Corroborating the results of this study, educational interventions on ASD have been shown in other studies to increase provider knowledge and self-efficacy rates.

When comparing the increases in knowledge among the different types of providers, results revealed no significant difference. Furthermore, analyzing the pre- and posttests using an analysis of variance showed that the change in knowledge was the same for all provider types between the pre- and posttests. Tsilimingras et al. (2018) conducted a study that focused on the effects of an ASD interprofessional educational intervention. The educational intervention was a six-hour didactic and experiential ASD education session among medical students, residents, nurse practitioners and other allied healthcare professionals. In the pre-questionnaire, participants were less knowledgeable about the importance of local community resources used for ASD treatment. The results of the post-questionnaire revealed that, after the educational intervention, participants had rated the awareness of local resources and networks to assist people with ASD in a rural community with a higher rate of importance,  $p = .002$ . The findings of this study correlate with the results of this project, demonstrating that an educational intervention increases awareness among healthcare professionals of the importance of local ASD resources in the treatment of ASD.

### **Limitations**

The limitations to the study were as follows:

1. The project was conducted via a virtual platform instead of in person due to COVID-19 restrictions.
2. Participants' comfort/knowledge of technology was not screened and therefore may have differed between participants, resulting in a lower posttest response rate.

3. Participation was lower in the post-questionnaire than in the pre-questionnaire.
4. The investigator was unable to match and compare participants' responses in the pre- and post-questionnaires because they were not assigned a random identification number.
5. The sample target was limited to pediatric clinicians in the large pediatric hospital; therefore, results may not reflect pediatric clinicians in other settings.

### **Implications for Advanced Practice Nursing**

The quality improvement project yielded significant results that affect nursing and medical provider practice when it comes to awareness and knowledge of local autism resources in Miami-Dade County. The project highlights the need for education on local ASD resources among pediatric clinicians as well as for continuing education. Based on the results of the study, the leadership of the medical resident program should enhance teaching on ASD treatment and incorporate further education on local ASD resources. Furthermore, nursing leadership should implement an annual review on local ASD resources for other allied health professionals to keep them well versed and to educate new pediatric clinicians on local ASD resources that are available in the community.

Additional supportive information should be readily available for all pediatric clinicians, such as the local ASD resource brochure that was developed and shared with the participants of the study. Positive feedback and requests from the participants support expanding additional brochures to cover local ASD resources in the Tri-county area of South Florida. Furthermore, participants expressed interest in having the brochure available in their medical offices to share with parents and patients with ASD. The importance of increasing knowledge of local ASD

resources among pediatric clinicians can improve provider care and self-efficacy levels and increase proper referrals and early interventions which can avoid delays in treatment and improve the patient's overall quality of life.

### **Dissemination of Information**

The DNP project abstract will be submitted in February 2022 through the abstract submission portal of the 51<sup>st</sup> annual Child Neurology Society national conference, which will be held on October 12<sup>th</sup>–15<sup>th</sup>, 2022 in Cincinnati, Ohio. The finalized DNP project will be submitted to two peer-reviewed journals, *The Journal of Child Neurology* and *The Journal of Pediatric Neurology*.

### **Conclusions**

The findings of the study showed that there was an increase in knowledge of community ASD resources among pediatric clinicians after an educational intervention. There was a significant difference between pretest and posttest knowledge reported by pediatric clinicians after receiving an educational intervention. However, the results showed neither a significant difference in knowledge between provider type, nor a difference between position and knowledge change indicating that change in knowledge was the same for all provider types between the pre- and post-questionnaires. The study helped to seal the gaps in the literature review since there were limited studies on pediatric clinicians of different provider types and knowledge of local ASD resources. The study supports the utility of continuing educational training in local ASD resources for pediatric clinicians to improve provider knowledge, self-efficacy levels, and quality of care provided to the patient population. The positive effects of this study, and the local ASD brochure that was shared among pediatric clinicians, will continue to

positively impact provider care and their ability to share their knowledge of local ASD resources with their patients and families.

**Diagrams/Tables**

**Table 1**

*Pre- and Post-Questionnaire Demographic Variables Among Pediatric Clinicians at a Large Pediatric Hospital in Coral Gables, Florida (N = 43)*

Characteristic	Pretest		Posttest	
	N	%	N	%
<b>Gender</b>				
Female	35	81	27	93
Male	8	19	2	7
<b>Age</b>				
20–29	14	33	6	21
30–39	18	42	7	24
40–49	1	2	2	7
50–59	7	16	10	35
> 60	3	7	4	14
<b>Race</b>				
White	35	81	24	83
Black/African American	1	2	4	14
Asian	3	7	1	3
Prefer not to respond	4	9	-	-
<b>Position</b>				
Medical resident	18	42	7	24
1 <sup>st</sup> year	6	14	-	-
2 <sup>nd</sup> year	9	21	5	17
3 <sup>rd</sup> year	3	7	7	24
Attending	1	2	-	-
Nurse practitioner	14	33	10	35
Other	10	23	12	41
<b>Years of experience<sup>a</sup></b>				
Less than 1 year	2	5	-	-
1–5 years	3	7	1	3
5–10 years	4	9	2	7
10–15 years	1	2	7	24
15+ years	5	12	7	24

<sup>a</sup> For attendings, nurse practitioners, or physician assistants only



**Table 2**

*Pre- and Post-Questionnaire Comparison of Educational/Training and Practice Experience Among Pediatric Clinicians at a Large Pediatric Hospital in Coral Gables, Florida (N = 43)*

<b>Type of Education or Training</b>	Pre		Post	
	<i>N</i>	%	<i>N</i>	%
Diagnosis of ASD	22	51	19	70
Treatment for ASD	18	42	18	62
Early Steps program	21	54	20	69
FDLRS program	5	12	14	48
Scholarships or grants for patients with ASD	2	5	14	48
Educational programs and schools	7	16	15	52
Center for Autism and Related Diseases	5	12	16	55
Parent to Parent	5	12	15	52
<b>Practice Experience</b>				
Utilized a screening tool for ASD	21	49	9	31
Diagnosed a patient with ASD	8	19	6	21
Referred a patient with ASD to any therapy	19	44	11	38
Referred a patient to Early Steps	15	35	8	28
Referred a patient with ASD to FDLRS	3	7	3	10
Discussed any ASD program/schools with patient or parent	6	14	6	21
Discussed any scholarship/grant with patient or parent	1	2	2	7
Discussed any type of parental resource for parents	4	9	4	14

**Table 3**

*Pre- and Post-Questionnaire Level of Knowledge of Autism Resources Among Pediatric Clinicians at a Large Pediatric Hospital in Coral Gables, Florida (N = 43)*

Item	Pre					Post				
	Strongly disagree N (%)	Somewhat disagree N (%)	Neither agree not disagree N (%)	Somewhat Agree N (%)	Strongly Agree N (%)	Strongly disagree N (%)	Somewhat disagree N (%)	Neither agree not disagree N (%)	Somewhat Agree N (%)	Strongly Agree N (%)
I am very familiar with signs and symptoms of autism spectrum disorder (ASD)		2 (5)	3 (7)	19 (44)	10 (23)	-	1 (3)	1 (3)	10 (35)	10 (35)
I have the necessary skills to properly administer and score screening tools for ASD	4 (9)	4 (9)	8 (19)	10 (23)	8 (19)	2 (7)	4 (14)	5 (17)	7 (24)	4 (14)
I have the necessary skills to properly diagnose a patient with ASD	4 (9)	4 (9)	9 (21)	12 (28)	5 (12)	4 (14)	2 (7)	5 (17)	8 (28)	3 (10)
I am very knowledgeable in the different	4 (9)	9 (21)	12 (28)	7 (16)	2 (5)	2 (7)	4 (14)	3 (10)	8 (28)	5 (17)

types of treatment options for ASD										
I am very familiar with speech therapy and ASD patients	4 (9)	6 (14)	4 (9)	16 (37)	4 (9)	1 (3)	3 (10)	5 (17)	7 (24)	6 (21)
I am very familiar with occupational therapy for ASD patients	5 (12)	8 (19)	1 (2)	16 (37)	4 (9)	1 (3)	3 (10)	5 (17)	7 (24)	6 (21)
I am very familiar with ABA therapy for ASD patients	7 (16)	5 (12)	5 (12)	10 (23)	7 (16)	3 (10)	1 (3)	4 (14)	8 (28)	6 (21)
I am very knowledgeable on ASD educational program/schools	11 (26)	11 (26)	6 (14)	5 (12)	1 (2)	1 (3)	3 (10)	5 (17)	9 (31)	4 (14)
I am very knowledgeable on scholarships and grants available for patients with ASD	18 (42)	9 (21)	4 (9)	2 (5)	1 (2)	3 (10)	4 (14)	3 (10)	7 (24)	5 (17)
I am very familiar with the	3 (7)	10 (23)	7 (16)	11 (26)	4 (7)	1 (3)	2 (7)	3 (10)	10 (35)	6 (21)

Early Steps Program										
I am very familiar with the FDLRS program	12 (28)	9 (21)	6 (14)	6 (14)	1 (2)	1 (3)	4 (14)	3 (10)	9 (31)	5 (17)
I am very familiar with CARD	17 (40)	9 (21)	4 (9)	3 (7)	1 (2)	1 (3)	6 (21)	2 (7)	8 (28)	5 (17)
I am very familiar with Parent to Parent	20 (47)	7 (16)	2 (5)	4 (9)	1 (2)	1 (3)	7 (24)	1 (3)	8 (28)	5 (17)

**Table 4**

*Pre- and Post-Questionnaire Self-Efficacy Level of Autism Resources Among Pediatric Clinicians at a Large Pediatric Hospital in Coral Gables, Florida (N = 43)*

Item	Pre					Post				
	Strongly disagree N (%)	Somewhat disagree N (%)	Neither agree not disagree N (%)	Somewhat Agree N (%)	Strongly Agree N (%)	Strongly disagree N (%)	Somewhat disagree N (%)	Neither agree not disagree N (%)	Somewhat Agree N (%)	Strongly Agree N (%)
I am confident in my knowledge of autism spectrum	1 (2)	7 (16)	5 (12)	13 (30)	7 (16)	4 (14)	-	2 (7)	8 (28)	7 (24)

disorder (ASD)										
I am comfortable administering and scoring screening tools for ASD	6 (14)	7 (16)	4 (9)	10 (23)	6 (14)	2 (7)	2 (7)	9 (31)	4 (14)	4 (14)
I am comfortable diagnosing a patient with ASD	8 (19)	5 (12)	8 (19)	10 (23)	2 (5)	3 (10)	2 (7)	7 (24)	5 (17)	4 (14)
I am confident referring a patient with ASD to the proper treatment options	5 (12)	7 (16)	6 (14)	12 (28)	3 (7)	1 (3)	2 (7)	5 (17)	9 (31)	4 (14)
I am confident in discussing local educational programs and schools for ASD	8 (19)	13 (30)	5 (12)	6 (14)	1 (2)	1 (3)	4 (14)	6 (21)	6 (21)	4 (14)
I am confident discussing different types of scholarships	11 (26)	11 (26)	7 (16)	3 (7)	1 (2)	2 (7)	4 (14)	7 (24)	3 (10)	5 (17)

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and grants for ASD patients										
I am confident discussing local parental resources for parents of children with ASD	11 (25)	10 (23)	6 (14)	5 (12)	1 (2)	2 (7)	3 (10)	5 (17)	6 (21)	5 (17)

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Figure 1

*Change in Mean Difference of Knowledge Level*

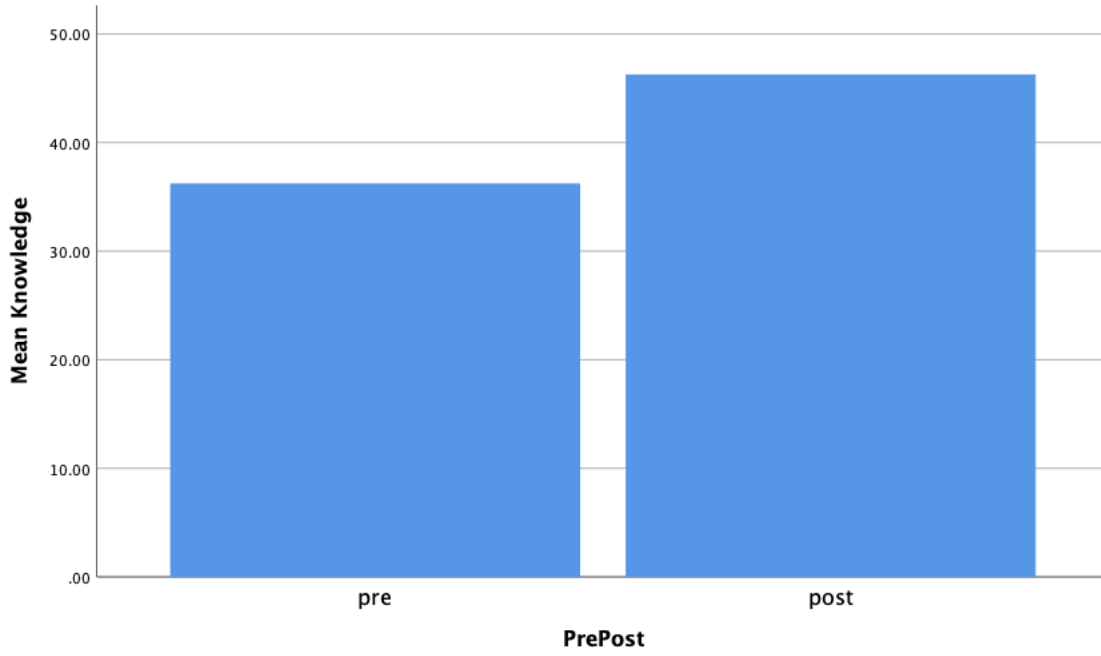
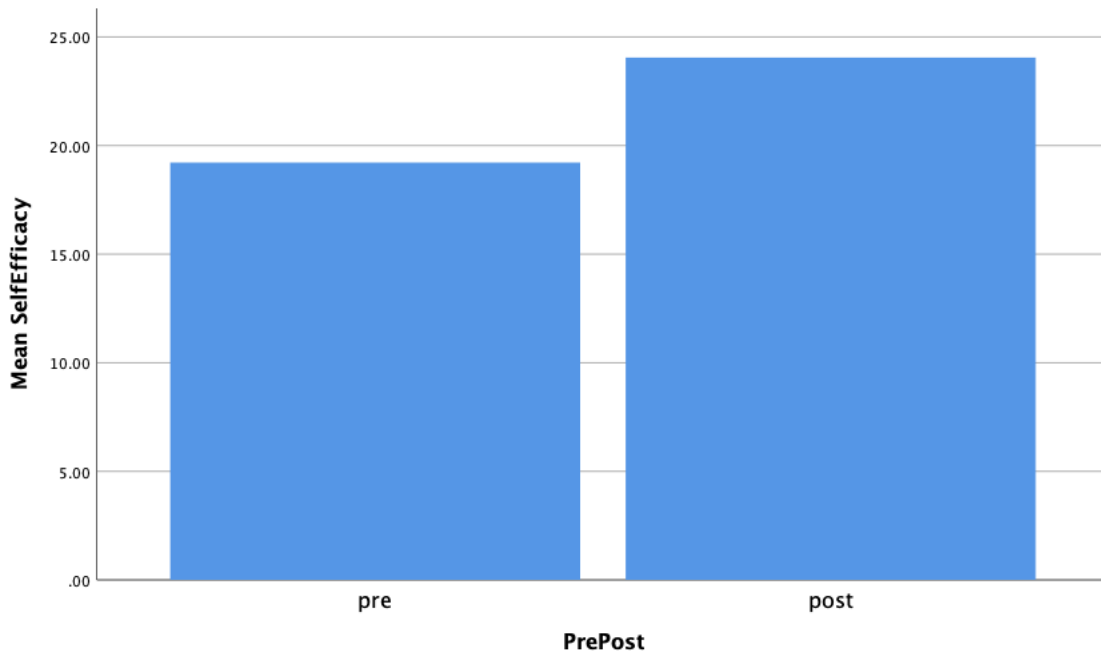


Figure 2

*Change in Mean Difference of Self-Efficacy Level*



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**Appendix A.****IRB Approval Letter**

Office of Research Integrity  
Research Compliance, MARC 414

**MEMORANDUM**

**To:** Dr. Ivette Hidalgo  
**CC:** Sarah Gutierrez  
**From:** Maria Melendez-Vargas, MIBA, IRB Coordinator  
**Date:** July 22, 2021  
**Protocol Title:** “Increasing knowledge of community autism resources amongst pediatric clinicians using an educational intervention: A quality improvement project.”

The Florida International University Office of Research Integrity has reviewed your research study for the use of human subjects and deemed it Exempt via the **Exempt Review** process.

**IRB Protocol Exemption #:** IRB-21-0327

**IRB Exemption Date:** 07/22/21

**TOPAZ Reference #:** 110534

As a requirement of IRB Exemption you are required to:

- 1) Submit an IRB Exempt Amendment Form for all proposed additions or changes in the procedures involving human subjects. All additions and changes must be reviewed and approved prior to implementation.
- 2) Promptly submit an IRB Exempt Event Report Form for every serious or unusual or unanticipated adverse event, problems with the rights or welfare of the human subjects, and/or deviations from the approved protocol.
- 3) Submit an IRB Exempt Project Completion Report Form when the study is finished or discontinued.

*Special Conditions:* N/A

For further information, you may visit the IRB website at <http://research.fiu.edu/irb>.

MMV/em

## Appendix B.

### Data Collection Documents

#### PRETEST-POSTTEST

#### Increasing knowledge of community autism resources amongst pediatric clinicians using an educational intervention

#### Introduction:

This questionnaire is an essential part of a quality improvement project aiming to increase the knowledge of local autism resources amongst pediatric physicians, medical residents, nurse practitioners, and physician assistants at Nicklaus Children's Hospital.

Please, answer to the best of your ability. Your response will help to understand gaps in knowledge and target areas for improvement. The questions are structured to assess your level of knowledge, your previous experiences and future referrals of local autism resources including therapies, educational facilities, and financial resources available in Miami-Dade County.

- *Please do not write your name or other personal information on this questionnaire.*
- *Your answers are anonymous and will be kept confidential.*
- *Your participation is voluntary and will not risk your current position.*

#### Demographic:

Gender: Female \_\_\_\_\_ Male \_\_\_\_\_ Non-binary/third gender \_\_\_\_\_

Prefer not to say \_\_\_\_\_

Age: 20-30 yrs. \_\_\_\_\_ 30 – 40 yrs. \_\_\_\_\_ 40-50 yrs. \_\_\_\_\_ 50-60 yrs. \_\_\_\_\_

>60 yrs. \_\_\_\_\_

Race: White \_\_\_\_\_ Black/African American \_\_\_\_\_ Hispanic/Latino \_\_\_\_\_

Asian \_\_\_\_\_ American Indian/Alaska Native \_\_\_\_\_

Native Hawaiian/Pacific Islander \_\_\_\_\_ Two or more races \_\_\_\_\_

Position: Resident \_\_\_\_\_ Fellow \_\_\_\_\_ Attending \_\_\_\_\_ Nurse Practitioner \_\_\_\_\_

Physician Assistant \_\_\_\_\_ Other \_\_\_\_\_

If you are a resident, what year are you in?

1<sup>st</sup> year \_\_\_\_\_ 2<sup>nd</sup> year \_\_\_\_\_ 3<sup>rd</sup> year \_\_\_\_\_ 4<sup>th</sup> + year \_\_\_\_\_

If you are a fellow, what year are you in?

1<sup>st</sup> year \_\_\_\_\_ 2<sup>nd</sup> year \_\_\_\_\_ 3<sup>rd</sup> year \_\_\_\_\_ 4<sup>th</sup> + year \_\_\_\_\_

If you are an attending, nurse practitioner or physician assistant, how many years of experience do you have?

Less than 1 year \_\_\_\_\_ 1-5 years \_\_\_\_\_ 5-10 years \_\_\_\_\_ 10-15 years \_\_\_\_\_

15+ years \_\_\_\_\_

### Questionnaire

#### Educational background

1. Have you received any type of training on diagnosis for autism spectrum disorder?

\_\_\_\_\_ no                      \_\_\_\_\_ yes

2. Have you received any type of training on treatment for autism spectrum disorder?

\_\_\_\_\_ no                      \_\_\_\_\_ yes

3. Have you received education on the Early Steps program?

\_\_\_\_\_ no                      \_\_\_\_\_ yes

4. Have you received education on the Florida Diagnostic & Learning Resources System (FDLRS) program?

\_\_\_\_\_ no                      \_\_\_\_\_ yes

5. Have you received education on scholarships or grants for patients with autism?

\_\_\_\_\_ no                      \_\_\_\_\_ yes

6. Have you received education on the educational programs and schools available for autism patients in Miami-Dade County?

\_\_\_\_\_ no                      \_\_\_\_\_ yes

**Educational level**

*Please respond to the following statements:*

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I am very familiar with signs and symptoms of autism					
I have the necessary skills to properly administer and score screening tools for autism					
I have the necessary skills to properly diagnose a patient with autism					
I am very knowledgeable in the different types of treatment options for autism spectrum disorder					
I am very familiar with speech therapy for autism patients					
I am very familiar with occupational therapy for autism patients					
I am very familiar with Applied Behavioral Analysis (ABA) therapy for autism patients					
I am very knowledgeable on autism educational programs/schools in Miami-Dade County					
I am very knowledgeable on scholarships and grants available for patients with autism					

I am very familiar with the Early Steps program					
I am very familiar with the FDLRS program					
I am very familiar with CARD					
I am very familiar with Parent to Parent					

**Clinical experience**

1. Have you ever utilized a screening tool for autism?  
 \_\_\_\_\_ no                      \_\_\_\_\_ yes
  
2. Have you ever diagnosed a patient with autism spectrum disorder?  
 \_\_\_\_\_ no                      \_\_\_\_\_ yes
  
3. Have you ever referred a patient with autism to any type of therapy?  
 \_\_\_\_\_ no                      \_\_\_\_\_ yes
  
4. Have you ever referred a patient with autism to Early Steps?  
 \_\_\_\_\_ no                      \_\_\_\_\_ yes
  
5. Have you ever referred a patient with autism to FDLRS?  
 \_\_\_\_\_ no                      \_\_\_\_\_ yes
  
6. Have you ever discussed any autism programs/schools with a patient or parent?  
 \_\_\_\_\_ no                      \_\_\_\_\_ yes
  
7. Have you ever discussed the any type of scholarship/grant for patients with autism with a patient or parent?  
 \_\_\_\_\_ no                      \_\_\_\_\_ yes

**Self-efficacy level**



*Please respond to the following statements:*

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I am confident in my knowledge of autism spectrum disorder					
I am comfortable administering and scoring screening tools for autism					
I am comfortable diagnosing a patient with autism					
I am confident referring a patient with autism to the proper treatment options					
I am confident discussing local educational programs and schools for autism					
I am confident discussing different types of scholarships and grants for autism patients.					
I am confident discussing local parental resources for parents of children with autism					

**Appendix C.****Support Letter from the Facility**

6/10/21

Dear Ms. Gutierrez,

This letter is to confirm support for your Quality Improvement project, “Increasing Knowledge of Community Autism Resources Amongst Pediatric Clinicians Using an Educational Intervention” to be implemented at Nicklaus Children’s Hospital. We support completion of this quality improvement educational initiative at Nicklaus, and request that prior to any work beginning you share your FIU IRB decision letter with us, sign and return your research agreement, and present to the Nursing Research and Evidence-Based Practice Council for final approval. The goals of this project align with those of our organization, and we welcome the opportunity to support this project at Nicklaus Children’s Hospital.

Sincerely,

*Danielle Sarik, PhD, APRN-PC, RN*

Danielle Sarik PhD, APRN, CPNP-PC  
Research Nurse Scientist  
Nicklaus Children’s Hospital



## Appendix D.

### Letter of Recruitment

Recruitment email for Increasing knowledge of community autism resources amongst pediatric clinicians using an educational intervention: A quality improvement project.

Dear Nicklaus Pediatric Clinician,

My name is Sarah Gutierrez, and I am a student from the Graduate Nursing Department at Florida International University. I am writing to invite you to participate in my quality improvement project. The purpose of this project is to improve pediatric clinicians' knowledge of local autism resources in Miami-Dade County. As a pediatric healthcare provider at Nicklaus Children's Hospital, you are eligible to partake in this study. I am contacting you with the permission of your medical director and the Nursing and Evidence Based Council at Nicklaus Children's Hospital.

If you decide to participate in this project, you will consent to completion of an anonymous pretest survey which is expected to take 10-15 minutes. Then you will be asked to register and attend an educational virtual presentation which is approximately 30-40 minutes long. Immediately following the presentation, you will be asked to complete an anonymous posttest survey which will take approximately 10-15 minutes. No compensation will be provided. All tests will be anonymous and will not pose any risks.

Please be advised, your participation is completely voluntary. If you would like to participate, please click on the link for the pretest survey [REDACTED]  
[REDACTED] If you have any questions about the study, please email or contact me at [REDACTED] or [REDACTED]

Thank you kindly,

Sarah Gutierrez