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Two Models for Evaluating Evidence-based Practices in Autism

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TWO MODELS FOR EVALUATING EVIDENCE-BASED PRACTICES IN AUTISM

Jennifer Lee Suppo

Abstract

The search for evidence-based practices within the realm of autism has continued to be at the forefront of autism discussions in education. The author describes two models, CEC Practice Study Manual (2008) and the National Standards Report (National Autism Center, 2009), for evaluating interventions as evidence-based practices (EBP) in autism, and compares and contrasts their features. The author applied the National Standards Report model, as it is the most frequently used model when evaluating EBP's, in an analysis of two interventions for children with autism spectrum disorders (ASD) that are known to be EBPs. The author applied the same model in an analysis of two interventions known to be at-risk for failure to meet EBP standards. Based on the comparisons and analysis, suggestions for the future direction of the EBP evaluation process are made. Additional recommendations are provided for incorporation of EBP in teacher preparation courses.

Introduction

Families, educators, and service providers of children diagnosed with autism all look for treatments that will be an effective intervention in helping an individual with autism reach his or her maximum potential. Many treatments are available to those who work with or have a child diagnosed with autism; however, researchers have found evidence-based practices (EBP) effective in helping children with a diagnosis of autism (Rogers & Vismara, 2008). What interventions constitute an evidenced based practice are sometimes clear and other times in question. An evaluative tool can be used in deciphering EBP. The author has chosen two models of evaluating interventions, The National Autism Center's 2009 National Standards Report and the Council for Exceptional Children's 2008 Classifying the State of Evidence for Special Education Professional Practices: CEC Practice Study Manual.

First, the author will examine The National Autism Center's 2009 National Standards Report. The report is designed to provide educators and parents with information on evidence-based practices in the treatment of children with autism. The report was created through a collaborative effort of many of the top experts in the field of autism. The team of experts developed a model of evaluation guidelines for examining the treatments for individuals with a diagnosis of autism. Using the evaluative tool and a set of inclusion and exclusion criteria, the team separated different treatments into categories, which included established treatments, emerging treatments, un-established treatments, and ineffective/harmful treatments.

To be included in The National Standards Report articles must first pass a set of inclusionary and exclusionary criteria (National Autism Center, 2009). The participants in the study must be diagnosed with autism and under the age of twenty-two. Studies that had a focus on parents and educators were not included. Lastly, the study must have been published in a

peer-reviewed journal. Exclusionary criteria were also established in The National Standards Report (National Autism Center, 2009). The report included educational and behavioral treatments; however, the report largely excluded biomedical treatments. Additionally, studies with co-morbid conditions were excluded. Furthermore, studies that did not include statistical data were excluded, which meant the exclusion of qualitative research.

Articles that pass through the inclusionary and exclusionary process were then compared to the Scientific Merit Rating Scale (SMRS), which was created by the team of experts (National Autism Center, 2009). Using the SMRS, articles are examined by the research design, measurement of the dependent variable, and measurement of the independent variable, participant ascertainment, and lastly, generalization. According to how an article fits into these elements determines the SMRS rating it is given, which includes SMRS 0-5, in which five is exemplar, and zero indicates that treatment does not meet the standards of what constitutes a study of "scientific merit" (p. 16).

The National Standards Report also included treatment effect ratings (National Autism Center, 2009). Each study in the report examined to establish if the treatment effects were beneficial, ineffective, adverse, or unknown using the Treatment Effect Rating criteria. For example, a single-case designed study that would be listed as an ineffective treatment would be one in which the results were not replicated, failed to collect over five data points in baseline and treatment conditions, and only had two participants. Another example would be a group design categorized under the adverse treatment rating because the data indicated the treatment resulted in a greater deficit or harm to a participant because of the studies implementation. The National Standards Report includes a list of inclusionary and exclusionary treatment criteria, a rubric for evaluating interventions effectiveness, a rubric to evaluate if the effects were beneficial, and a rubric with guidelines to compare the evaluations to different categories (established, emerging, unestablished, and ineffective/harmful) to determine whether a category of intervention is established as EBP. Next, the author will examine the Council for Exceptional Children's 2008 manual Classifying the State of Evidence for Special Education Professional Practices: CEC Practice Study Manual.

The Council for Exceptional Children's 2008 manual Classifying the State of Evidence for Special Education Professional Practices: CEC Practice Study Manual is also a source of evaluative rubrics for the evaluation of interventions and comparative categories of EBP. The CEC Practice Study Manual is designed to provide the reader with information on EBP's as was the National Standards Report (National Autism Center, 2009); however, the manual published by the CEC was not autism specific. The manual provides a standard set of indicators that individuals in the field of special education can use to understand what constitutes an EBP. It is the same standards that the CEC uses when considering a proposed study. The CEC Practice Study Manual (2008) includes a set of acceptance criteria for a proposed study and rubrics to use to analyze a completed study. The quality indicators were created out of a set of articles from Exceptional Children's 2005 journal, which included quality indicators for qualitative, group experiment and quasi-experimental, correlational, and single-subject research (Brantlinger, Jimenez, Klingner, Pugach, & Richardson, 2005; Gersten et al., 2005; Horner et al., 2005; Thompson, Diamond, McWilliam, Snyder, & Snyder, 2005). The CEC has included a detailed evaluative rubric to examine each experimental design

The CEC Practice Study Manual (2008) separates itself from the National Standards Report (National Autism Center, 2009), in several ways. First, it provides preliminary templates that can be used in setting up a research study. Conversely, the National Standards Report does not. Second, the CEC manual provides an evidence-based rubric, as does the National Standards

Report; however, the CEC includes within its research design categories group experiment and quasi-experimental, single-subject, causal approximating and correlational, qualitative research design. The National Standards Report only includes group and single subject design. Furthermore, the CEC Practice Study Manual (2008) evaluative model requires a minimum of three opportunities to measure behaviors across phase changes in single-case research whereas the National Standards Report (National Autism Center, 2009) required greater than five data points per condition to be considered within the study, which leaves out many effective studies.

Both the CEC Practice Study Manual (2008) and the National Standards Report (National Autism Center, 2009) include an evidence-based practice rubric. The CEC has three main classifications of evidence-based practices, which include positive effects, insufficient evidence-base, and negative evidence-base. The CEC further breaks down the insufficient evidence-base category into potentially positive, mixed effects and no discernible effects, which is similar to the National Standard Reports EBP rubric. Although both models for evaluating evidence-based practices offer unique perspectives the author will use the National Standards Report to analyze two interventions that are known to be EBP's and two that are known to be at-risk for failure to meet EBP standards because it was created specifically for autism studies which are the focus of the interventions to be examined.

Two Known EBS Interventions

The author will examine two interventions for children diagnosed with autism that was conducted using known EBP's. The author has chosen to use the National Standard Reports (National Autism Center, 2009) evaluative rubric for examining articles to categorize into a classification system of EBP. The author chose the interventions story-based interventions and peer training. First, a search in EBSCO Host using the words story-based intervention and autism was used pulling up only one unrelated article. Next, the author searched using the more commonly known words for this intervention, Social Stories, by Carol Gray, and the word autism produced 119 peer-reviewed articles. The article that was chosen was the first article on the list that met the inclusionary and exclusionary guidelines listed in the National Standards Report (Hanley-Hochdorfer, Bray, Kehle, & Elinoff, 2010).

The article that was chosen met both the inclusionary and exclusionary guidelines to retain for further analysis. The participants in the article by Hanley-Hochdorfer et al. (2010) were formally diagnosed with autism and under the age of twenty-two. The treatment presented was an educational treatment that could be conducted in multiple locations. Additionally, the article was published in a peer-reviewed journal. Moreover, there were no co-morbid conditions occurring with any of the participants that were not known to commonly occur in individuals with autism. Furthermore, the single-case study contained statistical data that was presented in a linear presentation. Lastly, the article was published in English.

As the study met the inclusionary and exclusionary criteria, the author used the National Standard Reports (National Autism Center, 2009) Scientific Merit Rating Scale (SMRS). The scale has five categories to determine the degree of effectiveness of an intervention. Interventions are examined by the research design, measurement of the dependent variable, and measurement of the independent variable, participant ascertainment, and lastly, generalization. Based on the criteria the interventions are categorized in SMRS using the numbers one through five with five being the highest degree of effectiveness and one being the lowest. Using the scale the author rated the study and the studies scores were three to five across all indicators. For example, Hanley-Hochdorfer et al. (2010) study is a five in research design exceeding the required number of data points per condition with greater than five and the number of

participants with greater than three. The study also obtained a five in the generalization of effects category by collecting maintenance and generalization data across more than two participants.

Before the final determination of whether a method of treatment is considered EBP, the study has to examine using the treatment effects scale to determine if the treatment was beneficial, ineffective, adverse, or unknown. Using the treatment effects rating scale, the Hanley-Hochdorfer et al. (2010) study's treatment effect was in the category of ineffective effect because the researchers failed to establish a functional relationship between the treatment and the effect, which the researchers acknowledge as minimal if any. Lastly, using the collected data from both the SMRS scores and the treatment effects ratings the National Standard Reports (National Autism Center, 2009) then categorizes a method of treatment as either established, emerging, unestablished, or ineffective/harmful thereby determining whether a category of intervention is established as EBP. The Hanley-Hochdorfer et al. study was a story-based intervention that is listed as an established intervention in the National Standard Report. When comparing the study to the inclusionary and exclusionary treatment criteria, the rubric for evaluating interventions effectiveness, and the rubric to evaluate if the effects were beneficial, the study is not consistent with the National Standard Reports findings. Hanley-Hochdorfer et al. study met the inclusionary and exclusionary criteria; its SMRS score were all between 3-5; however, it did not meet the beneficial treatment criteria and therefore does not accurately fit in the National Standard Reports listing it as an established treatment.

The author will next examine a commonly used treatment for individuals with autism: peer training. The author conducted a search using the words peer training and autism, and the search produced 58 peer-reviewed articles. Many articles were single subject design and had to be excluded because either the study did not show a linear representation of the finding or the study did not have five or more data points per condition. The chosen article was the first article on the list that met the inclusionary and exclusionary guidelines in the report and was retained for further analysis (Owen-DeSchryver, Carr, Cale, & Blakeley-Smith, 2008).

The article by Owen-DeSchryver et al. (2008) met the inclusionary criteria of both the linear presentation of the findings and the five or more data points per condition. The participants in the article diagnosed with autism and under the age of twenty-two. The treatment presented was an educational treatment that could be conducted in multiple locations. Additionally, the article was published in a peer-reviewed journal. Moreover, there were no co-morbid conditions occurring with any of the participants that were not known to commonly occur in individuals with autism. Furthermore, the single-case study contained statistical data that was presented in a linear presentation. Lastly, the article was published in English.

As the study met the inclusionary and exclusionary criteria, the author referred to the National Standard Reports (National Autism Center, 2009) Scientific Merit Rating Scale (SMRS). Using the scale the author rated the study and the studies scores were three to five across all indicators. For example, Owen-DeSchryver et al. (2008) study is a four in the measurement of dependent variable exceeding the percentage of data collected ($\geq 25\%$); however, the interobserver agreement does not meet the SMRS five percentage of $\geq 90\%$. The study obtained a five in the generalization of effects category by collecting maintenance data and generalization data collected across more than two persons. However, in the category of participant ascertainment the study is a three because an independent evaluator before the start of the study provided the diagnosis; however, independent and blind evaluators for research purposes did not confirm the diagnosis.

Prior to considering where an intervention belongs on the strength of evidence-classification system scales, the study was examined to establish if the treatment effects were

beneficial, ineffective, adverse, or unknown. Using the treatment effects ratings the Owen-DeSchryver et al. (2008) studies treatment effect is determined by the author to be a beneficial effect because the researchers established a positive functional relationship between the treatment and the effect. When comparing the study to the inclusionary and exclusionary treatment criteria, the rubric for evaluating interventions effectiveness, and the rubric to evaluate if the effects were beneficial, the study is consistent with the National Standard Reports findings.

Two Interventions At-Risk for Failure

The author will examine two interventions for children diagnosed with autism that was conducted using interventions that are at-risk for failure to meet EBP standards. The author will continue using the National Standard Reports (National Autism Center, 2009) evaluative rubric for classifying EBP for children diagnosed with autism. The author chose the interventions gluten and casein free diet and sensory integrative package. First, the author conducted a search in EBSCO Host using the words gluten and casein free diet and autism, which produced 140 peer-reviewed articles. The chosen article was the first article on the list that met the inclusionary and exclusionary guidelines in the report, so the article was retained for further analysis (Johnson, Handen, Zimmer, Sacco, & Turner, 2011).

The participants in the article by Johnson et al. (2011) were diagnosed with autism using two formal diagnostic tools, and they were under the age of twenty-two. The treatment presented was an educational treatment that could be conducted in multiple locations. Additionally, the article was published in a peer-reviewed journal. Moreover, there were no co-morbid conditions occurring with any of the participants that were not known to commonly occur in individuals with autism. Although the National Standard Report (National Autism Center, 2009) reviewed only educational and behavioral treatments, the report did make one exception in the area of diet intervention, which this article met the criteria to be included. Lastly, the article was published in English.

As the study met the inclusionary and exclusionary criteria, the author used the National Standard Report's (National Autism Center, 2009) Scientific Merit Rating Scale (SMRS). Measuring the intervention against the five SMRS categories of research design, measurement of the dependent variable, and measurement of the independent variable, participant ascertainment, and generalization the studies scores were between 0-2 across all indicators. For example, Johnson et al. (2011) research design meeting the number required for group size; however, it did not score higher because one of the two groups had less than 10 participants and there was a significant data loss possibility. In the category of participant ascertainment, the study is a two because the diagnosis was not said to be provided by an independent evaluator prior to the start of the study; however, they met the criteria of using two diagnostic instruments in the assessment of the participants who were suspected of having autism. The study was a 0 in the area of generalization because the researchers did not meet the criteria of SMRS 1-5, which at minimum included the generalization of data collection or maintenance data combined with subjective data.

Prior to placing the intervention on the strength of evidence- classification system, the study was examined against the treatment effects scale. Using the treatment effects ratings, the Johnson et al. (2011) study treatment effects were placed into the category of ineffective effect because the researchers failed to establish a functional relationship between the treatment and the effect.. Using the collected data from both the SMRS scores and the treatment effects ratings the Johnson et al. (2011) study was determined by the author to be in the ineffective category because although it had to rate on the SMRS scale between 0-2 there was not a benefit

established with this treatment. These findings are somewhat consistent with the findings and classification on the National Standards Report for gluten free/casein free dietary interventions, which listed the findings as un-established. What the results of this study and the National Standard Report show are that the claims of this intervention are unsubstantiated.

Next, the author examined sensory integration therapy also known as sensory integrative package in the National Standard Reports (National Autism Center, 2009). Using EBSCO Host, the author conducted a search using the words sensory integration and autism and the search produced 71 peer-reviewed articles. The article by Fazlioglu and Baran (2008) was then examined against other inclusionary, and an exclusionary criterion was chosen because it was the first article on the list that met the inclusionary and exclusionary guidelines in the report.

Although the treatment presented was not an educational treatment, the National Standard Reports (National Autism Center, 2009) included this intervention within the report because it meets the inclusionary and exclusionary requirements to be included however the studies do not support the use of the intervention for children diagnosed with autism. The participants in the article by Fazlioglu and Baran (2008) were diagnosed with autism according to the DSM-IV and under the age of twenty-two. Additionally, the article was published in a peer-reviewed journal, and there were no co-morbid conditions occurring with any of the participants that were not known to commonly occur in individuals with autism. Lastly, the article was published in English.

As the study met the inclusionary and exclusionary criteria, the author used the National Standard Report's (National Autism Center, 2009) Scientific Merit Rating Scale (SMRS). Measuring the intervention against the five SMRS categories of research design, measurement of the dependent variable, and measurement of the independent variable, participant ascertainment, and generalization the studies scores were 0-5 across all indicators. For example, the Fazlioglu and Baran (2008) study is a 5 in research design meeting the number of groups size, random assignment, over 10 participants per group and no evidence of data loss. In the category of participants, the study is a two because the only information on the verification that the participants had autism was the mention that all the participants found to have autism using the DSM-IV criteria. The study was a zero in the category of generalization of treatment effects because there is no maintenance data or generalization data.

Prior to placing the intervention on the strength of evidence- classification system, the study was examined against the treatment effects scale. Using the treatment effects ratings, the Fazlioglu and Baran (2008) study treatment effects were placed into the category of unknown treatment effect because although the study shows a decrease in measured sensory problems, the study failed to control many variables. Using the collected data from both the SMRS scores and the treatment effects ratings the National Standard Reports (National Autism Center, 2009) the Fazlioglu and Baran (2008) study falls into the un-established category because their rating on the SMRS scale was between 0-5 and the result of their study using the treatment effects scale were unknown treatment effects. These findings are consistent with the findings and classification on the National Standards Report for the sensory integrative package.

Future Direction of EBP Evaluation

The four interventions reviewed are commonly used to treat children with autism. However, as shown, their outcomes vary significantly, and tools such as the ones provided in the National Standard Report (National Autism Center, 2009) and CEC Practice Study Manual (2009) need to continue to be used to substantiate the claims made by researchers and practitioners in the field of autism. When examining both the National Standard Report and the

CEC Practice Study Manual the author observed the inclusionary and exclusionary criteria were different. For example, the CEC had evaluative tools for examining qualitative studies, which were exempt from the National Standard Report. Additionally, many families and practitioners of children with autism latch on to the latest treatment trend out of desperation to find something that works, many of which many have no benefit to the individual with autism as evidenced with gluten and casein free diets. The discrepancies in interpretation of EBP, differences between evaluative tools, and the ongoing need for EBP for children with autism, there is a need to continue to refine tools used to establish EBP. Refining the tools to establish EBP will provide standards that allow others in the field to draw firm conclusions on the results of a study on EBP subsequently enabling the educators, parents, and related service personnel to make informed intervention decisions.

One area that needs to be addressed in the evaluative tools of the National Standards Report published by the National Autism Center (2009) is in the area of qualitative studies. As previously noted, The National Standards Report does not provide educators with evaluative rubrics for qualitative studies. The use of qualitative studies has been shown to be effective in the field of education to lead those in the field as Shavelson and Towne (2002 p. 99-100) refer to as a descriptions of "What is happening?" and "Why or how it is happening?" which can include "seeking to understand the effect of teaching strategies on student learning." For the field of autism to continue to search for effective EBP, the National Autism Center must open its evaluative measures to include qualitative studies. As cited the Council for Exceptional Children's 2008 Classifying the State of Evidence for Special Education Professional Practices: CEC Practice Study Manual (p. 71) that the field of education must not only learn "What works?" the field of education must also ask "What works with whom, by whom, in what contexts, and for what outcomes?" The author suggests for the National Autism Center to look towards the CEC Practice Study Manual's 2008 Qualitative Study Rubric and revise the rubric to be used in evaluating qualitative studies in the field of autism according to autism experts. Seeking to understand why and how an intervention strategy does or does not work is as important as finding an intervention effective in a study to be able to replicate the effects across environments and participants. Professionals and parents both need to understand the "why," "how" and "with whom" of any EBP intervention so that the field can determine why an EBP works in one study; yet, ineffective in another.

The author observed some discrepancies with the articles used in examining the evaluative rubric of the National Standards Reports. For example, the findings of the study of social story interventions did not meet the beneficial treatment criteria outlined in the evaluative rubrics, which was contradictory to the National Standard Report findings on social story intervention usage. However, as noted by the researchers in the limitations section of the study conducted by Hanley-Hochdorfer et al. (2010), the EBP social story intervention might not have been matched properly to the participants in the study. For example, the peer interaction with the participants to encourage reciprocal peer interactions based on a social story written to appropriate peer/participant interactions, may not have been reinforcing to the participants and as the researchers noted may have served more as punishment for the participants. The researchers did not ascertain if just the peer interactions alone would be reinforcing to continue reciprocal social interactions between the peers and the participants diagnosed with autism. Moreover, the researchers stated the social story tool itself might not have matched the individual needs of the students. For example, the social story contained a verbal description of the desired behavior; however, the social story was not paired with realistic pictures of the setting and the individual peers, which has been shown to enhance the effectiveness of social

stories (Schneider & Goldstein, 2010). The study conducted by Hanley-Hochdorfer et al. (2010) demonstrates the main deficit in the National Standard Report; the report gives very little attention to addressing the need to match the EBP with the needs of the individual child. Although both The National Autism Center's 2009 National Standards Report and the Council for Exceptional Children's 2008 Classifying the State of Evidence for Special Education Professional Practices: CEC Practice Study Manual are useful in establishing EBP, the author believes the future direction of EBP tools should contain a component of matching the intervention to the participant. Which segways into another critical component of EBP, educating future and current teachers in teacher preparation courses how to select and implement EBP.

Incorporating EBP in Teacher Preparation Courses

Both new and seasoned educators need to be equipped with effective, easy to understand evaluation tools that allow them to sort through the multitude of treatment options available for children with autism. Explicitly teaching both special and general educators to use these tools will help teachers make intervention decisions that can have positive outcomes for their students with autism. Incorporating this into teacher preparation programs can be accomplished in many ways. For example, students in a teacher preparation course should be taught how to use one of the evaluation tools by comparing it to published studies. Another example, of incorporating EBP in teacher preparation courses is having the students implement an EBP within a field placement. However, the author believes that some of the focus of EBP needs to shift to properly selecting the EBP to meet the needs of the individual student for whom the intervention is intended and properly implementing the EBP.

Within teacher preparation programs, educators are taught EBP. Evaluative tools such as those provided by National Standard Report (National Autism Center, 2009) and CEC Practice Study Manual (2009) are necessary for educators to evaluate what is and what is not EBP. However, establishing an intervention as EBP for children with autism does not necessarily mean that its usage is appropriate for every child with autism (Stichter, Crider, Moody, & Kay, 2007). The authors suggests that teacher preparation courses incorporate the use of EBP evaluative tools so that the educators have knowledge of how to select EBP interventions for their students; however, teacher preparation programs need to move beyond how to select EBP into how to select the appropriate EBP for the individual student for which the intervention is intended. For example, teachers should conduct a needs inventory for the individual student to match the EBP with the child's needs. Just because an intervention is for children with autism does not mean there is a "one size fits all" approach to EBP selection. Students in introductory teacher preparation classes can start to explore selecting and matching appropriate EBP interventions to individual students with case studies. However, the use of selecting the appropriate EBP to meet the needs of an individual student needs to go beyond just appropriate selection.

Teacher preparation programs need also to focus on the implementation of a selected EBP intervention. A chosen intervention must be implemented with fidelity to increase the likelihood of success (Detrich, 1999). Teachers need to understand the importance of implementing an intervention program to collect data on its usage to both ensure that it is properly being used and that any student gains that are made can be attributed to the intervention. This will enable educators to correct any discrepancies in EBP usage to help obtain maximum effectiveness of the chosen intervention. Additionally, if an EBP intervention is not successful, the teacher can take the appropriate actions to remedy the situation and put in place an EBP intervention that will lead to success for the individual student.

Lastly, the author suggests that teacher preparation courses include educating teachers on the importance of maintenance and generalization of newly taught skills across settings when implementing an EBP intervention. To increase the likelihood that a student with a diagnosis of autism who has success with an EBP intervention will maintain and generalize the taught skills across settings, educators need to provide information on EBP interventions to the families of the students. Researchers have demonstrated that parents can successfully provide treatment to their children diagnosed with autism when the parent is provided with parent training in EBP interventions (Koegel, Symon, & Koegel, 2002; Solomon, Necheles, Ferch, & Bruckman, 2007). The author suggests that teacher preparation programs include information on parent training on EBP interventions and provide students in teacher preparation programs with activities that create autism fact information sheets for families. Additionally, students can learn how to present information to parents through parent workshops and seminars that would include both dissemination of information and related activities on EBP interventions.

In summation, all teacher preparation programs need to incorporate learning how to use EBP evaluative tools and how to distinguish between an EBP and an intervention that may be detrimental to the student for which the intervention is intended. This includes interventions that are inappropriately selected for an individual student based solely on the fact that a student shares the same label, for example, autism, as the proposed EBP intervention. Educators need to understand how to select the correct EBP intervention based on the individual student's needs. Furthermore, teachers need to disseminate EBP information to both professionals in the field and parents of the students they serve so as to ensure the best outcome for the individual student, because at the center of this discussion is the person with autism and their needs should always be the very first thing considered in using EBP interventions.

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