Pseudoscientific Therapies for Autism Spectrum Disorder

28

Bruce A. Thyer

What Is Autism Spectrum Disorder?

The standard approach to diagnosing mental disorders in the United States, and widely used throughout the world, is an authoritative book called the *Diagnostic and Statistical Manual of Mental Disorders* (DSM, American Psychiatric Association 2013). Now in its fifth edition, the DSM has been plagued by controversy from its inception. Some issues deal with the minutia of the various signs and symptoms and duration presented by a given person needed to arrive at a particular diagnosis. Others are much more fundamental, such as serious conceptual problems with the very definition of what constitutes a mental disorder and of the validity of the various categories described. Some diagnoses come and go. The DSM-2 did not include homosexuality and/or autism. Later editions did. Now the DSM-5 does not include them but does claim that obstructive sleep apnea disorder (most commonly caused by being overweight) *is* a mental disorder, as is smoking, called tobacco use disorder. Persons with cognitive impairment due to traumatic brain injury are similarly asserted to suffer from a mental disorder. Some authorities assert that any condition with a clearly evident biological cause (e.g., genetic disease, brain trauma or infection, endocrine abnormality, etc.) should not be construed as a mental disorder at all and that this latter term should be reserved for conditions which have their etiology in the person's mind, not in demonstrable physical pathology of the body.

The phenomena called autism have similarly suffered at the hands of psychiatrists making up their "minds." The DSM-5 uses the term autism spectrum disorder, while previous editions used autistic disorder. The DSM-2 did not contain any diagnosis dealing with autism at all (APA, 1968). Asperger's disorder was found in earlier editions of the DSM, but it has been eliminated by the DSM-5. Now of course the actual disorders in behavior which have been used to label someone variously as autistic, autistic disorder, Asperger's disorder, or autism spectrum disorder do not ebb and flow at the whim of the latest edition of the DSM. The field of human psychopathology is much like the former planet Pluto. For years it was considered a true planet. Now it is not. Pluto the object, whatever we call it, remains unchanged. Similarly the condition called autism spectrum disorder is similarly unmoved, and behavioral scientists and other specialists continue to study persons with this condition, attempt to discover its causes, and develop effective treatments. This can be done regardless of the current favored terminology. Many disciplines do not make use of the DSM-5 system of diagnosis at all. Behavior

B. A. Thyer (✉)
College of Social Work, Florida State University, Tallahassee, FL, USA
e-mail: Bthyer@fsu.edu

J. L. Matson (ed.), *Handbook of Intellectual Disabilities*, Autism and Child Psychopathology Series, https://doi.org/10.1007/978-3-030-20843-1_28

analysts, for example, eschew global diagnostic labels in favor of focusing on specific behavioral excesses or deficits, and working directly on behavior change, usually through programs of reinforcement, shaping and extinction (punishment is very rarely used). This is a very successful approach to helping persons with ASD and does not require using the DSM-5.

The DSM-5 criteria for autism spectrum disorder (ASD) cover one and half pages, so just a brief summary will be given here:

> Autism spectrum disorder is characterized by persistent deficits in social communication and social interaction across multiple contexts, including deficits in social reciprocity, nonverbal communicative behaviors used for social interaction, and skills in developing, maintaining, and understanding relationships. In addition to the social communication deficits, the diagnosis of autism spectrum disorder requires the presence of restricted, repetitive patterns of behavior, interests or activities. (APA, 2013, p. 31)

ASD must appear fairly young in the child's life and is often, but not always, accompanied by intellectual disability. In severe ASD the person may be unable to talk or otherwise readily communicate and may display self-injurious behavior or motor stereotypes. The precise causes of ASD remain elusive. The DSM-5 notes that a proportion of ASD cases are associated with a known genetic mutation, but there is currently no genetic test used in practice which is of value in making the diagnosis. At present the diagnosis is arrived at clinically, via observation of the client (preferably over multiple contexts and times, supplemented with valid rating and observational scales), a careful history taking, and interviews with the patient (where possible), parents, and other caregivers. That a diagnosis is arrived at clinically is true for almost all the DSM-5 disorders—there are no legitimate genetic, brain scan, blood, tissue, or other tests which contribute to the diagnoses (except for the IQ tests used to diagnosis intellectual disability). Parents naturally want to know why their child acts the way they do, but the only correct answer at present is "We do not know what causes ASD."

Clinicians can be more confident in asserting what does *not cause* ASD, although many candidate etiological factors have been forward. Of most of these, the evidence is either solely anecdotal, too weak to draw scientifically legitimate conclusions from, or solidly pointing that given candidate causes are *not* responsible—such as sugar, food dyes, heavy metals, gluten or casein intolerance, deficiencies in blood flow to the brain, hormone imbalances (e.g., secretin), vitamin deficiencies, and parental child-caring practices. Our present inability to determine the causes of ASD is frustrating and perhaps hinders the development of treatments more effective than existing therapies. However, the precise etiology of a good many of the conditions found in the DSM is similarly vague, yet intervention research aimed at testing therapies proceeds unabated, and this includes treatments for ASD.

Treatment Versus Cure

When discussing therapies for ASD, it is important to distinguish between cures versus treatments. Many conditions, medical and psychosocial, have cures. Some form of intervention is provided for the clients, and following a course of therapy, the condition is gone. Antibiotics for bacterial infections are one example of a medical cure. Gradual real-life exposure therapy for clinical phobias is a curative example drawn from psychosocial conditions. However, for many conditions, complete cures remain elusive. Most therapies for ASD are efforts to enhance functional behavior, improving social skills, for example, or reading and conversational abilities. Other treatments are aimed at reducing problematic features of ASD, such as self-injurious behavior, movement stereotypies, and self-stimulating activities such as excessively spinning objects. Taken in isolation, these treatments may be beneficial, but you still have a person who displays many other features of ASD. Perhaps their talking is improved, but other behaviors typical of ASD remain. There are promising treatments which when offered very early in the child's life, last hours per day, over several years, have apparently resulted in children who become indistinguishable from normal

and function well in school with normal intelligence (see Lovass, 1987), but access to such early intensive behavioral interventions (EIBI) remains quite limited. The US Food and Drug Administration is very clear on this issue: "One thing that it is important to know about autism up front: There is no cure for autism. So, products or treatments claiming to 'cure' autism do not work as claimed" (see https://www.fda.gov/ForConsumers/ConsumerUpdates/ucm394757.htm).

What Are Research-Supported Therapies?

For a treatment for ASD to be considered scientific, it should be supported by a substantial amount of empirical research that has been published in quality peer-reviewed journals, with the large preponderance of the evidence indicating that the treatment is, first of all, safe. Next it is important to demonstrate that the treatment is better than doing nothing. The third is that the treatment yields results that are considerably better than those achieved by providing a credible placebo treatment to the client. The fourth is that the new treatment produces results at least equivalent to a therapy which is already considered to be effective. The fifth is that the positive results of the new treatment are maintained over time (ideally months or years). The sixth is that the new treatment does not produce unpleasant side effects (this is related to but not the same as safety). And the seventh is that the new treatment is broadly effective across a wide range of clients, boys and girls, people of different races and ethnicities, etc. To achieve these benchmarks for a novel therapy for persons with ASD requires a significant, long-term period of intensive investigations, ideally conducted by researchers independent of the inventor of the new therapy, and with no significant financial or other potential conflicts of interest which could bias the results of the investigators (e.g., they market a competing form of treatment). To accomplish these tasks, clinical researchers in ASD employ various safeguard in their research. For example, persons being considered for potential inclusion in the treatment study are carefully assessed by expert diagnosticians so we can be sure the clients are really genuine instances of ASD. Assessments of client functioning and behavior are conducted by persons independent of those delivering treatments and, ideally, are unaware of what treatment the client they are assessing will receive or has received. The therapy is delivered via some structured protocol or treatment manual, to ensure faithful adherence to the principles of the intervention. A test evaluating a treatment which was sloppily administered is not a fair evaluation of that therapy. Ideally clients who meet a study's inclusionary criteria are randomly assigned to the new or experimental treatment and to various control conditions (e.g., no-treatment condition, waiting-list or delayed therapy condition, alternative accepted treatment, placebo treatment). This helps insure that the two or more groups of clients are genuinely similar prior to receiving treatment. If this is done, and the two or more groups are different after treatment, then these differences can be attributed to the various treatment conditions the clients received and not to spurious factors such as the passage of time, placebo influences, therapist biases, etc. Even then, it is desirable that a given new treatment which passes all these hurdles and is seemingly effective be tested *again*, by different researchers in other settings, at least once and preferably more than one more time.

Studies like this are called randomized experiments and, when applied to persons with various medical or psychosocial disorders, are given the further term of randomized clinical trial, or RCT. RCTs are generally considered to be a very credible form of evidence needed to draw legitimate conclusions about the effects of a new treatment. When such treatments are repeatedly tested in RCTs and published in scientific journals, a substantial body of literature can accumulate regarding a given newer treatment, and the results of many such RCTs can be combined and the overall results summarized. A statistical tool to do this is called a meta-analysis (MA), and in a proper MA, the various studies' strengths and limitations can be taken into account when

arriving at a conclusion. For example, a RCT study with a sample size of 200 clients would be afforded more weight in the MA calculations than one involving only 50 persons. By combining mathematically all the results obtained in the various studies, one can get a better estimate of the "true" effects of a given therapy for ASD.

A more elaborate method of combining the results of many studies on a given therapy is called a *systematic review* (SR). Systematic reviews are usually conducted by interdisciplinary treatment teams, and very diligent steps are taken to locate *all* available studies which have evaluated a given therapy. This may include studies that were published in international journals, and perhaps unpublished doctoral dissertations, and even unpublished reports. Studies are independently graded for their overall quality and methodological rigor, and the conclusions from the stronger studies are given more weight than those from weaker ones. Most SRs incorporate meta-analysis into their methodology. The best SRs are produced by two major groups, the Cochrane Collaboration (www.cochrane.org) and the Campbell Collaboration (www.campbellcollaboration.org), and very careful methodological checks and controls are used to reduce bias as much as possible. For example, completed draft reports of SRs are independently reviewed by two or more experts and suggestions made to improve it. One can search the web-based libraries of Cochrane and Campbell for completed SRs dealing with the topic of ASD.

The above processes reflect some of the practices of legitimate *scientific inquiry*, and this approach can generally be labeled *between-subject designs* because comparisons are made between groups of clients. There are other credible paths which can be used however to evaluate treatments. One major alternative is called within-subject designs. In this approach, instead of studying changes on average scores of functioning between groups exposed to different treatments, and analyzing the results using complex statistical analysis, the clinical researcher studies only one client and take multiple measures of their functioning over time prior to a new intervention being applied. Then the same measurement strategy is used to assess client functioning while the new treatment is being applied and perhaps after it is removed. The results are usually depicted via line graphs and interpreted visually, not using statistics. Just as one can look at a graph of how the stock market has performed during the past 2 weeks, one can look at a graph of client functioning. If the pretreatment data (the baseline) are stable and then after treatment is introduced, client functioning dramatically improves, and this is very evident by simply looking at the graph; one has tentative evidence the treatment produced a favorable effect. If the baseline was lengthy and stable, and substantial behavior changes occurred immediately after treatment began, this makes for more robust causal inference than if changes were small or appreciably delayed after treatment began. There are various approaches to strengthening the internal validity (our ability to make valid casual inferences about the effects of the treatment under investigation) of within-subject designs. One way is to deliberately remove and then restore a therapy with short-term effects. If improvement follows the introduction of therapy, and deterioration follows the withdrawal of treatment (and is followed by improvement when treatment is reinstituted), then the potential for causal inference is high ("Yes! Treatment caused those improvements!"). Another approach is to track the functioning of several clients with the same problem and introduce treatment to one but not the others, then to the others sequentially. If the first client who received treatment improved and the others did not, until they too received treatment, causal inferences can also be strongly enhanced. A further variant is called the $N = 1$ randomized trial, which may be possible to undertake when a client is receiving a short-lived treatment. The client's functioning is baselined, using a valid and reliable measure (or several), and then one of two treatments is randomly allocated to be given that day. In the case of medications, it may be possible to use a blinded approach wherein the caregiver or clinician does not know if they are administering the active drug or a placebo pill. The treatment allocated is determined each day by a coin toss. Functioning is recorded

for a number of days, and then the blinding is broken. The data from days the client received the active drug are compared with the days when he/she received placebo or a different medication. If the two treatments exerted differential effects, this will be clearly evident from the graphed data and an informed decision then made about what course of therapy to provide over a longer term. Certain psychosocial interventions can also be evaluated in this manner.

Within-subject designs have been used in many disciplines for a long time. The classic text *An Introduction to the Principles of Experimental Medicine* by Claude Bernard (1865/1927) described their use, and the Russian physiologist Ivan Pavlov used them extensively in his research and was awarded the Nobel Prize for his discoveries. Like between-subject designs, within-subject designs require the use of reliable and valid measures of the client's behavior, except instead of measuring behavior just a few times across many people, as in controlled before and after RCT studies, within-subject studies take many measures before and after treatment from one person. This permits a more fine-grained and detailed analysis of individual change and represents an investigatory methodology that does not require expensive grant funding. Indeed, this is a major strength of within-subject studies in that they can be incorporated into everyday clinical practice aimed at helping persons with ASD. This can and is being done but not widely (Nikles & Springer, 2015; Schork, 2015). Like between-subject designs, within-subject designs are also amenable to having their results aggregated using meta-analysis procedures. See Bellini and Akullian (2007) for an example of this. One of the founders of the evidence-based practice movement has stated that certain forms of within-subject designs are more useful for making decisions in clinical practice about the care of individual patients than are RCTs and SRs (Guyatt, Rennie, Meade & Cook, 2002). Thus there are two major pathways to making legitimate conclusions about the effects of various treatments applied to persons with ASD, between-subject designs and within-subject studies. Each has their merits and limitations.

Legitimate scientific research emphasizes the publication of results of therapeutic trials in professional journals that make use of blind peer review and accords higher weight to such studies than information disseminated via other outlets such as press releases, television talk shows, the Internet, news briefings, reports available on websites or internally produced by a treatment's developers, testimonials, and so forth. Usually an article submitted for possible publication in a professional is sent to two or more reviewers, persons with expertise in the subject matter of the paper. The reviewers do not know the authors' names, gender, or affiliations. They provide a detailed critical appraisal of the research and a recommendation to the journal's editor to accept the work, to reject it, or to suggest that it be revised by the author and resubmitted. This process of blind peer review helps ensure that high-quality work is accepted and low-quality work is not published, at least within that particular journal. This screening is why journal publications are accorded greater credibility than other means of disseminating information.

Another feature of legitimate science is its openness to being disappointed. As Thomas Huxley said "The great tragedy of science - The slaying of a beautiful hypothesis by an ugly fact." Good research on a treatment for ASD does *not* set out to prove that it works. It adopts a more neutral attitude and tries to see what the effects of the treatment *are* and is equally open to learning that the treatment was effective or that it was not. In fact good science bends over backward to prove that a treatment *does not work*! For example, if a group of kids with ASD had their functioning rated by their parents, and the kids then received a treatment which was followed by apparent improvements, rather than taking this for strong proof that the treatment worked, the researchers would design a stronger study, better capable showing that it did *not* really work. This next study might use a no-treatment control group—some kids got the treatment and others did not. If the treated group got better, their results would be compared with those of the group that did not get treatment. If the treated group was no better off than the untreated group,

what would that tell the researchers about the value of their therapy? It did not work! This would perhaps be personally disappointing, but it would be better to conduct such a study, and screen out an ineffective therapy, before releasing it to the public for use with kids with ASD. Or another study might use independent observers, not the parents, to rate the kids' functioning, so as to reduce potential biases introduced by parental expectancies. Hence all the successive levels of controls introduced in good-quality RCTs help better demonstrate that something *does not work*. Through progressively more stringent investigations, as a new therapy passes each "test," we can become a little more confident that it really may work, better than the passage of time, better than placebo, etc. Then we hold our breath, so to speak, to see if others can successfully replicate our positive results. If this happens once, then again, and more times, by independent researchers around the world, we grow progressively more and more optimistic that the new treatment is genuinely helpful.

What Are Pseudoscientific Therapies?

Pseudoscience has been defined as "a body of beliefs and practices whose practitioners wish, naively or maliciously, pass for science although it is alien to the approach, the techniques and the fund of knowledge of science" (Bunge, 1998, p. 41). For a variety of reasons, the field of ASD lends itself to being vulnerable to a variety of pseudoscientific claims pertaining to the presumed etiology of the condition, methods of assessing persons with ASD, and most dangerously, methods of treating the condition. Here is how one set of writers explained this vulnerability to pseudoscience:

> "Parents are typically highly motivated to attempt any promising treating, rendering them vulnerable to promising 'cures'. The unremarkable physical appearance of autistic children may contribute to the proliferation of pseudoscientific treatments and theories of etiology. Autistic children typically appear entirely normal; in fact many of these children are strikingly attractive…The normal appearance of autistic children may lead parents, caretakers and teachers to become convinced that there must be a completely 'normal' or 'intact' child lurking inside the normal exterior…the course can vary considerably among individuals… there is a great deal of variability in response to treatments…persons with autism sometime show apparently spontaneous developmental gains or symptom improvement in a particular area for unidentified reasons. If any intervention has recently been implemented, such improvement can be erroneously attributed to the treatment, even when the treatment is actually ineffective. In sum, autism's pervasive impact on development and functioning, heterogeneity with respect to course and treatment response, and current lack of curative treatments, render the disorder fertile ground for quackery." (Herbert, Sharp, & Gaudiano, 2002, p. 24)

What are some of the features of pseudoscientific therapies? Typically these therapies are claimed to be highly effective but lack the robust evidentiary support of scientifically legitimate treatments. Sometimes the level of evidence is solely that of personal anecdote or one individual's (often a parent) experience with something. The claim is made that removing something from the diet (e.g., sugar, gluten, particular food dyes, etc.) of the person with ASD was followed by remarkable improvements. Or that adding something to their diet produced equally miraculous positive changes. Many times some form of therapy (e.g., facilitated communication) was administered which seemingly resulted in amazingly enhanced functioning, and those responsible for the care of the person with ASD make it their personal mission to promote this new miracle cure. Here is an example of the latter type of claim:

"Kalel Santiago…was diagnosed with severe, non-verbal autism. At age 9, he hadn't spoken his first word—until his parents tried a controversial treatment… a hemp oil that includes a form of cannabis. Two days later, he was speaking. Kalel's parents sprayed the compound cannabidiol (CBD) in the boy's mouth twice per day, and they say the results were astounding. "He surprised us in school by saying the vowels A-E-I-O-U. It was

the first time ever," dad Abiel told Yahoo Parenting. "You can't imagine the emotion we had, hearing Kalel's voice for the first time. It was amazing. The teacher recorded him and sent it to my wife and me, and we said, 'well, the only different thing we have been doing is using the CBD.'" Soon he was saying full words. "He said, 'amo mi mama,' 'I love my mom,'" Abiel says. "I don't know how to thank [the CBD oil makers]." (https://www.parenting.com/news-break/cannabis-spray-treatment-helps-9-year-old-autism-learn-to-speak)

Anecdotes like this, especially if repeated, can be the focus of popular magazine articles, which spark a flurry of interest resulting in parent purchasing the latest remedy du jour (see for example, Borchardt, 2015), aided and abetted by companies which manufacture and sell the new purported cure for a profit. A variation on the use of testimonials from parents are assertions from various well known respected figures such as celebrities or from 'Doctors'. These people look into the camera and say, in effect, "Take it from me, this treatment really works." This line of persuasion relies on 'authority', sometimes augmented by the accoutrements of the white coat and stethoscope.

Another characteristic of pseudoscientific treatments is the use of jargon, neologisms, or simply nonsensical words of phrases to explain the effects of the new therapy, or the invocation of mysterious forces or energies heretofore unknown to mainstream science. Such language affords the patina of real scientific explanations and may deceive the uninitiated, but legitimately trained researchers will recognize a bogus argument right off the bat. Here are some additional hallmarks of pseudoscience;

- "Exploited expertise—A genuine expert in one field provides testimonials in an area outside the expert's area.
- Bogus expertise: a supposed expert claims to possess scientific or practice credentials that are simply false, or originated from diploma mills or otherwise unaccredited universities (see Thyer, 2019).
- Financial conflicts of interest: The promoters of the new ASD therapy have a financial investment in the success of the treatment.
- Inflated research support: Exaggerated claims are made on the basis of poorly designed or conducted research, or research published in journals with very low scientific standards.
- Misleading research support: Findings from a well done study are misrepresented or outright erroneously reported.
- False research support: A study is published in a scientific journal but the actual study was never conducted. Sometime even highly respected journals get hoaxed by unscrupulous authors, some of whom are even doctors!
- Grandiose claims: The new ASD treatment is said to be curative, or amazingly effective for a wide array of signs and symptoms.
- Claims of a 'Quick Fix': The ASD treatment is said to produce improvements very rapidly.
- Implausible mechanism of action: The new treatment is said to work via processes which seem highly unlikely, given what is known about ASD. For example, the treatment called Facilitated Communication is based on the premise that persons with ASD are of normal intelligence, but are trapped in bodies that do not work properly or permit them to speak. There is no evidence that this is true. Hyperbaric oxygen therapy is premised on the idea that the brains of persons with ASD suffer from enduring levels of oxygen deprivation, or of reduced blood flow to the brain. There is no evidence that this is true.
- Claims that the new ASD therapy is rejected by the mainstream treatment community because it threatens vested interests, those who may not want to see the new highly

effective treatment promoted, and therefore try and suppress it.

- The claim being made is virtually impossible to test, for example, the assertion that ASD is caused by unknown allergies. When test after test fails to reveal a putative allergen, or one dietary restriction after another fails to help the person with ASD, the fault is not with the implausible theory, but is simply that the correct test or food causing ASD has not yet been identified. Parents and caregivers may spend a fortune vainly seeking the Holy Grail of allergens." (this section in quotation marks was adapted from Hupp, Mercer, Thyer, & Pignotti, 2019).

Having provided some hallmarks of potential pseudoscientific treatments for ASD, let us examine a few by name in the following section."

Selected Examples of Pseudoscientific Treatments for ASD

Camel's Milk: Yes, some researchers have suggested camel's milk as a treatment for ASD (e.g., Al-Ayadhi & Elamin, 2013). Before rushing out to the nearest camel dairy, one should read the conclusion of a systematic review on the topic. "Based on the evidence, camel milk should not replace standard therapies for any indication in humans" (Mihic, Rainkie, Wilby, & Pawluk, 2016).

Intravenous Secretin: In 1998, Horvath et al. published a study involving three children with ASD who were administered intravenous secretin, and they claimed, with no quantitative data, that the children had improved eye contact, expansion of expressive language, and heightened alertness. Since that time a number of studies have investigated the effects of secretin, and in 2012 a comprehensive systematic review sponsored by the Cochrane Collaboration was published examining the effects of secretin on ASD. The conclusion?

"There is no evidence that single or multiple dose intravenous secretin is effective and as such currently it should not be recommended or administered as a treatment for ASD" (see https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD003495.pub3/full?highlightAbstract=secretin)

Omega-3 Fatty Acids Supplementation: It has been suggested that children with ASD suffer from insufficient omega-3 fatty acids and that providing dietary supplements of this product could reduce the signs and symptoms of ASD. One early case report on using this treatment was published by Johnson and Hollander (2003) and was followed by a number of other published studies. These studies were collected and analyzed in a systematic review supported by the Cochrane Collaboration in 2011. The overall finding? "To date there is no high quality evidence that omega-3 fatty acids supplementation is effective for improving core and associated symptoms of ASD" (see https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD007992.pub2/full?highlightAbstract=autism).

Chelation: Chelation is a form of treatment which is said to remove stored or circulating stored toxic metals (e.g., lead, mercury), with these metals being the etiological agent causing ASD. With this theory in mind, some practitioners concluded that chelation medical therapies which removed these metals from the body of the child with ASD would help reduce signs and symptoms. This is done via administering a chelating substance which binds to heavy metals to the patient, intravenously, by mouth, or by injection, with the metals subsequently being excreted via urine. The procedure is not without risks, as harmful effects and deaths have been reported. Chelation therapy for ASD was the subject of a 2015 Cochrane-sponsored systematic review. The conclusion?—"The quality of the evidence is poor. Only one trial was included in this review, and we judged it to have high or uncertain risk of bias and methodological problems that limited the interpretation of outcomes presented. Given the deleterious effects of chelation, misinterpre-

tation and misuse of the study of Adams et al. to justify the use of chelation for ASD is unethical and potentially places children unnecessarily in harm's way. Moreover, if these findings are in fact valid, they actually undermine the heavy metal toxicity theory and the rationale for chelation treatment, suggesting that it should not be used in the first place" (cited from https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD010766.pub2/full?highlightAbstract=autism).

If the theory is heavy metals cause autism, heavy metals are removed through chelation therapy, and the child does not improve, this tends to falsify the underlying theory of this treatment. If the theory is incorrect, continuing to deliver treatment based on a demonstrably false theory is unlikely to prove helpful, hence the suggestion by the authors of the above SR that chelation should not even be attempted.

Acupuncture: Acupuncture is based on a theory that the human body is surrounded by an invisible energy field undetectable to science (thus far). These lines of energy intersect at various places on the human body, points called meridians, and that human physical illness and emotional distress are caused by blockages in the free flow of this energy, sometimes called qi or chi. By inserting small needles under the skin at precise meridian positions, it is said that the proper flow of qi can resume and health restored. Variations of conventional acupuncture include pressing or tapping on these meridians (acupressure), passing small amounts of electric current through the needles, twirling the inserted needles, and holding smoldering bundles of herbs near the meridians (called moxibustion). An even more implausible form of acupuncture is called Tong Ren, which involves the Tong Ren practitioner holding a plastic doll with the meridian points depicted on it, and pounding these points with a small magnetic hammer, while thinking of the patient. This is said to produce healing in the distant patient, who may not even be aware that he/she is being remotely treated. Tong Ren is being advertised as a legitimate therapy for persons with ASD (see https://theory.yinyanghouse.com/treatments/tongren_for_autism).

In 2011, the Cochrane Collaboration published a systematic review of the effects of conventional acupuncture for ASD. The conclusion?—"Current evidence does not support the use of acupuncture for treatment of ASD. There is no conclusive evidence that acupuncture is effective for treatment of ASD in children and no RCTs have been carried out with adults" (cited from https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD007849.pub2/full?highlightAbstract=autism).

For clinical researchers, acupuncture lends itself very nicely to placebo-controlled trials, wherein some patients receive "real" acupuncture, with the needles being placed in the theoretically correct positions, and other randomly assigned to have the needles placed in meridians that are deliberately chosen because they are incorrect for the condition being treated, or by randomly placing the needles on spots *not* said to be meridians. For many conditions, when real acupuncture has been compared to sham acupuncture, fake treatment proves as useful as real treatment, suggesting the entire theory and protocols of convention acupuncture are simply an elaborate placebo. This was the conclusion of Moffet (2009), following a systematic review of these studies. If this is the case, we have no reason to anticipate that acupuncture for persons with ASD will produce more any benefits than placebo treatments, since such negative results have been found in the treatment of many other conditions.

Hyperbaric Oxygen Therapy: The rationale for hyperbaric oxygen therapy (HBOT) as a treatment for ASD is the theory that the brains of persons with ASD suffer from reduced blood flow and/or reduced levels of oxygen in the blood going to the brain. HBOT involves placing the patient with ASD, usually with a trusted caregiver, in a hyperbaric chamber, and exposing both to increased air pressure and an oxygen-enriched atmosphere, usually for several hours at a time, for treatments being daily or less frequently for long periods of time, perhaps weeks. Clinic-based treatments can be done in hard chambers, but portable chambers can be acquired for home use. HBOT is very expensive. One review published by Dunleavy and Thyer (2014) concluded:

"Studies reviewed did not offer credible evidence to suggest that HBOT is an effective treatment for autism. Conclusion: It is premature to call HBOT an effective treatment for Autism and ASD. Individuals clinically treated with HBOT outside the context of a RCT should have the effects of the therapy evaluated using rigorous single-subject designs" (p. 1). A more comprehensive systematic review sponsored by the Cochrane Collaboration in 2016 found that: "To date, there is no evidence that hyperbaric oxygen therapy improves core symptoms and associated symptoms of ASD. It is important to note that adverse effects (minor-grade ear barotrauma events) can occur. Given the absence of evidence of effectiveness and the limited biological plausibility and possible adverse effects, the need for future RCTs of hyperbaric oxygen therapy must be carefully considered" (cited from https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD010922.pub2/full#CD010922-abs-0007). Of note here is that the authors not only concluded that the treatment has little evidence to support its clinical use but also that the underlying biological theory is so implausible as to suggest this therapy should not even be studied any more.

Bicom Therapy: The Bicom apparatus (a picture of it can be seen here, (https://lymeknowledge.wordpress.com/2016/06/30/rife-bio-resonance/) or simply by Googling Bicom is an impressive-looking supposedly medical device which is said to detect pathogens and stressors afflicting someone and causing ill health. It is said to do this by detecting some type of unique "vibration" of the harmful agent residing in the patient's body. Then, once detected, the machine is said to be able to feedback a counter or corrective vibration into the patient's body to eliminate the problem. This is called bioresonance therapy. The Bicom diagnoses not through any legitimate test but through the putative assessment of bodily energies unknown to science, and the therapy too involves vibrations or energies which science cannot otherwise detect. Bicom therapy is being advertised to treat persons with ASD, and caregivers are told:

"Bioresonance therapy has shown promising results when used amongst patients diagnosed with autism – both young and old. The technique utilizes the body's own electromagnetic waves in order to promote improved healing capabilities, better metabolism and improved detoxification. Even though bioresonance therapy is not able to correct the damage that autism has dealt to the patient's brain, this therapy has been shown to enhance the function of the patient's brain; thus allowing them to experience an improvement in their symptoms…."(cited from: https://bioresonance.com/bioresonance-therapy-and-autism/)

Here is another explanation of how the Bicom device works:"Bioresonance therapy is a therapy with patient's own electromagnetic frequency patterns. The patient's own electromagnetic oscillations of his body are received by electrodes working as an antenna and fed into the device. The BICOM device changes the body's own information with the help of special electronic systems into therapy signals, which are returned to the patient by the output cable. Due to this method the electromagnetic pathologic information in the body is eliminated i.e. reduced. The patient and the therapy device enter a feedback cycle." (cited from https://www.quackwatch.org/01QuackeryRelatedTopics/Cancer/bioresonance.html)

One can read online testimonials about the powerful effects of bioresonance therapy delivered via the Bicom (http://www.bioresonance-therapy.com.sg/testimonials-adhdorautism). The treatment is not approved by the Federal Food and Drug Administration for use with humans (only animals), but unscrupulous clinicians use this bogus device and a convincing line of jargon and neologisms to persuade parents and caregivers to bring their child in for diagnostic and therapy services. Some parents purchase the machine themselves and use it at home with their child with ASD. Treatments are very expensive, and another red flag is the vast number of diseases and conditions the Bicom is said to be able to cure. Bicom therapy could be held up as a perfect poster child for pseudoscientific treatments for

ASD. The mechanism of action is theoretically implausible. The level of evidence remains at the testimonial stage, despite more than two decades of use. It is expensive. It uses scientific-sounding jargon to impress. Tellingly, what does the company's own website say, in tiny print at the bottom of the page? "In conventional medicine, however, Bicom bioresonance has not been subject to scientific research and is not yet recognized" (cited from https://www.regumed.com/bioresonance-for-doctors-naturopathic-practitioners/method/costs.html).

This latter confession brings us to the ethics of offering pseudoscientific treatments.

The Ethics of Pseudoscientific Therapies for ASD

Supporters of pseudoscientific therapy often counterarguments such as those presented in this chapter with the view that there is no harm in providing treatments which provide hope and even that the delivery of placebo therapies is legitimate. In juxtaposition to this, the World Medical Association has published its *Declaration of Helsinki—Ethical Principles for Medical Research Involving Human Subjects* (https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/), saying:

"Use of Placebo

> 33. The benefits, risks, burdens and effectiveness of a new intervention must be tested against those of the best proven intervention(s), except in the following circumstances:
> Where no proven intervention exists, the use of placebo, or no intervention, is acceptable; or where for compelling and scientifically sound methodological reasons the use of any intervention less effective than the best proven one, the use of placebo, or no intervention is necessary to determine the efficacy or safety of an intervention and the patients who receive any intervention less effective than the best proven one, placebo, or no intervention will not be subject to additional risks of serious or irreversible harm as a result of not receiving the best proven intervention. Extreme care must be taken to avoid abuse of this option.

Unproven Interventions in Clinical Practice

> 37. In the treatment of an individual patient, where proven interventions do not exist or other known interventions have been ineffective, the physician, after seeking expert advice, with informed consent from the patient or a legally authorized representative, may use an unproven intervention if in the physician's judgement it offers hope of saving life, re-establishing health or alleviating suffering. This intervention should subsequently be made the object of research, designed to evaluate its safety and efficacy. In all cases, new information must be recorded and, where appropriate, made publicly available."

In general the advocates of pseudoscientific ASD therapies have no motivation to conduct properly controlled experimental evaluations of their treatments. They have nothing to gain except unwelcome news; thus few accumulate any substantial body of research evidence. The clinical use of unproved interventions is very strictly limited; thus practitioners who knowingly provide treatments that are essentially placebo-type of therapies are practicing unethically. This appears to be the case for a number of the pseudoscientific interventions described in this chapter. And interventions which simply lack sufficient evidence to draw a conclusion should be tested against best available treatments.

The American Medical Association also weighs in on this topic.

"Code of Medical Ethics Opinion 2.1.4

> A placebo is a substance provided to a patient that the physician believes has no specific pharmacological effect on the condition being treated. The use of placebo, when consistent with good medical care, is distinct from interventions that lack scientific foundation…In the clinical setting, the use of a placebo without the patient's knowledge may undermine trust, compromise the patient-physician relationship, and result in medical harm to the patient.
> Physicians may use placebos for diagnosis or treatment only if they:
>
> (a) Enlist the patient's cooperation. The physician should explain that it can be possible to achieve a better understanding of the medical condition by evaluating

the effects of different medications, including the placebo.

(b) Obtain the patient's general consent to administer a placebo. The physician does not need to identify precisely when the placebo will be administered. In this way, the physician respects the patient autonomy and fosters a trusting relationship, while the patient may still benefit from the placebo effect.

(c) Avoid giving a placebo merely to mollify a difficult patient. Giving a placebo for such reasons places the convenience of the physician above the welfare of the patient. Physicians can produce a placebo-like effect through the skillful use of reassurance and encouragement, thereby building respect and trust, promoting the patient-physician relationship, and improving health outcomes." (cited from: https://www.ama-assn.org/delivering-care/use-placebo-clinical-practice)."

The Code of Ethics for Behavior Analysts is particularly strong in advocating for the provision of research-based therapies for clients with ASD. For example:
"2.09 Treatment/Intervention Efficacy. (a) Clients have a right to effective treatment (i.e., based on the research literature and adapted to the individual client). Behavior analysts always have the obligation to advocate for and educate the client about scientifically supported, most-effective treatment procedures. Effective treatment procedures have been validated as having both long-term and short-term benefits to clients and society" (cited from https://www.bacb.com/wp-content/uploads/170706r_compliance_code_english.pdf).

No other profession serving persons with ASD includes such a strong ethical requirement regarding the practitioner's obligation to provide scientifically supported treatments.

There are good reasons for avoiding placebo-equivalent treatments. A thorough review of clinical trials comparing real therapies to placebo treatments found that the latter had very little meaningful impact on clinical outcomes in medicine. The authors concluded "we found little evidence that placebos in general have powerful clinical effects…The use of placebo outside the aegis of properly designed clinical trials cannot be recommended" (Hrobjartsson & Gotzsche, 2001, p. 1599). Another reason is that a profession which relies primarily on placebo influences to obtain patient-reported improvements (e.g., chiropractic, naturopathy, acupuncture) is held in low self-esteem by health-care professionals operating from more of an evidence-based practice orientation. And certainly one does not need years of graduate and post-graduate training to be a placebo therapist. The hallmark of a legitimate health-care professional is one's capacity to deliver treatments that are *more* beneficial than credible placebos.

Apart from placebo influences, there are a large number of reasons why genuinely ineffective treatment may appear to work. Lilienfeld, Ritschel, Lynn, Cautin, and Latzman (2014) provide a comprehensive discussion of 25 additional reasons. These were grouped into three categories: (1) erroneous perceptions of client change, in its absence (15 possible reasons), (2) misinterpretations of actual client change stemming from extra-therapeutic factors (eight factors), and (3) misinterpretations of actual client change stemming from nonspecific treatment factors (three factors, include placebo). Anyone evaluating treatment outcome studies for ASD should keep these alternative explanations in mind when attempting to account for apparent client improvements. They conclude their compelling article with the following observation: "Science, which is a systematic approach to reducing uncertainty in our inferences… is ultimately our best prescription against being deceived by inadequate evidence" (Lilienfeld et al., 2014, p. 378). Not all purveyors of pseudoscientific treatments for ASD are charlatans, but it matters little to the recipient of such services whether the therapist is honestly misguided or a knowing purveyor of autistic snake oil. The end result is the same. No improvements beyond placebo factors. Loss of money. False hope. Wasted time. Disillusionment. Possible injury.

A chapter-length treatment of topic cannot do justice to the field as only a few examples of pseudoscientific treatments can be briefly described. The reader is referred to several of the book-length analyses devoted to the topic, e.g., Jacobson, Foxx, and Mulick (2005), Foxx and Mulick (2015), and Offit (2010) as well as to some excellent chapters (e.g., Tizikow & Holburn, 2011). This chapter's focus on pseudoscientific therapies for ASD may leave the reader a bit frustrated in that little mention was made of well-established research-supported treatments.

Nor was there discussion of the possible role of prescription psychotropic medications. This latter omission can be partially justified on the basis that very little is known. In the United States, the Federal Food and Drug Administration has only approved two medications for use in treating ASD, risperidone and aripiprazole, and these are intended to reduce irritability, an important but very limited goal (LeClerc & Easley, 2015), although the off-label use of everything under the sun is common among prescribers—tranquilizers to subdue patients, anti-psychotic agents, antidepressants, hormones like oxytocin, stimulant medications, and so forth.

The American Psychiatric Association provides the following guidance touching on this issue:

"Clinical decision-making without established research evidence to guide practice requires informed clinical judgments drawing on the best available research, adherence to the ethical principles of beneficence and non-maleficence, and sound theoretical reasoning. When usual treatments have failed, psychiatrists may offer nonstandard or novel interventions using a shared decision-making approach grounded in the patient's informed consent and a thorough discussion of risks, benefits, and alternatives to the innovative treatment. Since innovative practice sometimes leads to important scientific advances, it should not be categorically discouraged; however, because it may prove ineffective or even harmful, psychiatrists should proceed with caution in their use of clinical innovation. When considering use of clinical innovation, psychiatrists should consider first consulting colleagues and exploring other resources to ensure that careful thought has been given to possible alternatives as well as to the safest and most effective use of innovative interventions." (cited from file:///C:/Users/Bthyer/Downloads/APA-Commentary-on-Ethics-in-Practice.pdf)

Clinically innovative practices is a nice way of saying off-label prescribing, using drugs for purposes for which they not been approved. More honest way is to describe it as clinical experimentation on vulnerable human beings. Note the caveat that this is justifiable only when usual treatments have failed. This should be thoroughly documented, with empirical data, before any such off-label prescribing is undertaken. I suggest some more prescriptive guidelines are in order, such as:

- Medication should be tried only after less intrusive methods of treatment have been given a legitimate trial. Examples could include behavior analysis, environmental modification, parent training, etc.
- Whenever medication is intended to produce changes in behavior, affect, or cognition, a credible baseline series of measures of these variables must be taken, prior to introducing the medication. These measures should have acceptable levels of reliability and validity. When the health and safety of the patient with ASD is at risk, this requirement for a baseline may be omitted.
- When medication is provided, ongoing valid assessments of the outcome measures (behavior, affect, cognition) must be obtained on a regular basis, and any changes in the medication regimen should be based on these data. The data must be properly recorded and available in the client's records.

These recommendations are completely consistent with the fifth step of evidence-based practice "evaluating our effectiveness and efficiency" (Straus, Glasziou, Richardson, & Haynes, 2011, p. 3) as well as in partial compliance with relevant behavior analyst ethical standards:

"(a) Behavior analysts conduct current assessments prior to making recommendations or developing behavior-change programs. The type of assessment used is determined by client's needs and consent, environmental parameters, and other contextual variables. When behavior analysts are developing a behavior-reduction program, they must first conduct a functional assessment. (b) Behavior analysts have an obligation to collect and graphically display data, using behavior-analytic conventions, in a manner that allows for decisions and recommendations for behavior-change program development" (cited from

Section 3.01 of https://www.bacb.com/wp-content/uploads/170706r_compliance_code_english.pdf)

Other stipulations could readily be made concerning the monitoring of potential side effects, the value of periodic drug holidays, the need for appropriate medication tapers rather than abrupt discontinuance, and the required use of written informed consent from the caregivers for such treatments. See Cohen and Jacobs (1998) for one example of such a form.

Summary

Pseudoscientific therapies for persons with ASD are widely available. They are avidly sought after by despairing parents and caregivers and equally avidly promoted by their advocates. Some advocates are honestly mislead, and others are more akin to therapeutic hucksters and quacks, eager to dishonestly earn money or to acquire a reputation as a marvelous healer. There are many reasons why ineffective therapies can appear to "work," and it requires intense effort over many years to develop a sufficiently strong research base so as to be able to ascertain if a treatment is effective or not. Most interventions tested are not effective, which tends to discourage such long-term research programs. This chapter has provided some guidelines to help recognize a potentially pseudoscientific therapy and described a selected number of these. Far too many remain unrecognized as a bogus treatment. The marketing and sales of pseudoscientific treatments can be a big business, yielding sizeable returns for those who promote them.

There is a growing literature on identifying pseudoscientific treatments, and increasingly practitioners who take a more evidence-based practice approach to care are willing to confront and disclose professionals who dishonestly promote bogus ASD and other therapies under the umbrella of their credentials as a medical doctor, psychologist, social worker, or other types of practitioner. Such efforts should be encouraged, although at times it seems akin to playing "whack-a-mole," in that while temporarily suppressed (e.g., facilitated communication) the practice springs forth anew, perhaps under a different name (e.g., rapid prompting method). The president of the American Speech-Language-Hearing Association deserves credit, for example, for taking on a testimonial editorial that appeared in the *Wall Street Journal* which advocated for a pseudoscientific treatment called the rapid prompting method, which is warmed-over facilitated communication, a long discredited therapy said (erroneously) to permit inarticulate persons with ASD to type fluently (Davis-McFarland, 2018).

Psychologist Jean Mercer has established a Facebook page called *Psychology CE Watch—When Approved Courses Don't Meet Stated Standards* (see https://www.facebook.com/groups/161745967794736/), devoted to disclosing professional continuing education programs which contain pseudoscientific content and coordinating complaints to the American Psychological Association when such CE content does not adhere to the APA's (minimal) required standards of research support. All professionals are welcome to join this page and help identify such programs and to submit complaints through the proper channels. Several previously approved CE programs had had their APA approval removed through this initiative. A couple of divisions of the APA have undertaken a similar initiative, to identify and coordinate complaints about bogus CE courses. This is described on the above website.

Eventually it is hoped, more caregivers of person with ASD who receive pseudoscientific treatments will not just complain but will file lawsuits alleging malpractice at the hands of the professionals delivering the therapy. Winning such lawsuits will be an effective way to discourage providing illegitimate treatments, as will major professional association issuing more position statements condemning the practice of selected pseudoscientific treatments. Science-based treatments are slowly growing in number but are being outpaced by the proliferation of bogus therapies. Professionals in the field of developmental disabilities need to become less tolerant of these cuckoos in our nest, and push them out,

before these fledglings come to dominate the marketplace, to the disadvantage of persons with ASD and their families.

References

Al-Ayadhi, L. Y., & Elamin, N. E. (2013). Camel milk as a potential therapy as an antioxidant in autism spectrum disorder. *Evidence-based Complementary and Alternative Medicine, 2013*, 602834.

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

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th edition). Washington, DC: Author.

Bellini, S., & Akullian, J. (2007). A meta-analysis of video modeling and video self-modeling interventions for children and adolescents with autism spectrum disorders. *Exceptional Children, 73*, 264–287.

Bernard, C. (1865/1927). *An introduction to the study of experimental medicine*. New York: Macmillan.

Borchardt, D. (10 June, 2015). Desperate parents of autistic children trying cannabis despite lack of studies. *Forbes*. Retrieved from https://www.forbes.com/sites/debraborchardt/2015/06/10/desperate-parents-of-autistic-children-trying-cannabis-despite-lack-of-studies/#1f29aa266616

Bunge, M. (1998). *Philosophy of science: From problem to theory, volume one (revised edition)*. New Brunswick, NJ: Transaction.

Cohen, D., & Jacobs, D. (1998). A model consent form for psychiatric drug treatment. *International Journal of Risk and Safety in Medicine, 11*, 161–164.

Davis-McFarland, E. (28 September, 2018). RPM for autism not supported by science (letter). *Wall Street Journal*. A14.

Dunleavy, D. J., & Thyer, B. A. (2014). Is hyperbaric oxygen therapy an effective treatment for autism: A review. *Journal of Adolescent and Family Health, 6*(1), Article 5. Retrieved from http://scholar.utc.edu/jafh/

Foxx, R. M., & Mulick, J. A. (Eds.). (2015). *Controversial therapies for autism and intellectual disabilities* (2nd ed.). New York: Routledge.

Guyatt, G., Rennie, D., Meade, M. O., & Cook, D. J. (2002). Introduction: The philosophy of evidence-based medicine. In G. Guyatt & D. Rennie (Eds.), *Users guide to the medical literature* (pp. 5–71). Chicago: AMA Press.

Herbert, J. D., Sharp, I. R., & Gaudiano, B. A. (2002). Separating fact from fiction in the etiology and treatment of autism. *The Scientific Review of Mental Health Practice, 1*, 23–43.

Horvath, K., Stefanos, G., Sokolski, K. N., Nabors, L., & Tildon, J. T. (1998). Improved social and language skills after secretin administration in patients with autistic spectrum disorders. *Journal of the Association for Academic Minority Physicians, 9*, 9–15.

Hrobjartsson, A., & Gotzsche, P. C. (2001). Is the placebo powerless? An analysis of clinical trials comparing placebo with no treatment. *New England Journal of Medicine, 344*, 1594–1602.

Hupp, S., Mercer, J., Thyer, B. A., & Pignotti, M. (in press). Pseudoscience in child and adolescent psychotherapy: Skeptical guide for therapists and parents. In S. Hupp (Ed.), *Pseudoscience in child and adolescent psychotherapies: Ineffective, implausible, and potentially harmful treatments*. New York: Springer.

Jacobson, J. W., Foxx, R. M., & Mulick, J. A. (Eds.). (2005). *Controversial therapies for developmental disabilities: Fad, fashion, and science in professional practice*. Mahwah, NJ: Lawrence Erlbaum.

Johnson, S. M. & Hollander, E. (2003). Evidence that eicosapentaenoic acid is effective in treating autism. The Journal of Clinical Psychiatry, 64, 848–849.

LeClerc, S., & Easley, D. (2015). Pharmacological therapies for autism spectrum disorder: A review. *Pharmacy and Therapeutics, 40*, 389–397.

Lilienfeld, S. O., Ritschel, L. A., Lynn, S. J., Cautin, R. L., & Latzman, R. D. (2014). Why ineffective psychotherapies appear to work: A taxonomy of causes of spurious therapeutic effectiveness. *Perspectives on Psychological Science, 9*, 355–387.

Lovass, I. (1987). Behavioral treatment and normal educational and intellectual functiong in young autisic children. Journal of Abnormal Child Psychology, 20, 555–566.

Mihic, T., Rainkie, D., Wilby, K. J., & Pawluk, S. A. (2016). The therapeutic effects of camel milk: A systematic review of animal and human trials. *Journal of Evidence-based Complementary and Alternative Medicine, 21*, NP110–NP126.

Moffet, H. H. (2009). Sham acupuncture may be as efficacious as true acupuncture: A systematic review of clinical trials. *Journal of Alternative and Complementary Medicine, 14*, 213–216.

Nikles, J., & Springer, G. (Eds.). (2015). *The essential guide to n – of – 1 trials in health*. New York: Springer.

Offit, P. A. (2010). *Autism's false prophets: Bad science, risky medicine, and the search for a cure*. New York: Columbia University Press.

Schork, N. J. (2015). Time for one-person trials. *Nature, 520*, 609–611.

Straus, S. E., Glasziou, P., Richardson, W. S., & Haynes, R. B. (2011). *Evidence-based medicine: How to practice and teach it* (4th ed.). New York: Churchill Livingstone.

Thyer, B. A. (2019). Predatory doctoral programs: Warnings for social workers. *Journal of Social Work Education., 55*(1), 5–10.

Tizikow, J. E., & Holburn, S. (2011). Identifying fad therapies for autism spectrum disorders and promoting effective treatment. In J. Matson & S. Peter (Eds.), *International handbook of autism and pervasive developmental disorders* (pp. 307–319). New York: Springer.