

**I N T E G R A T E D   D O C U M E N T   D E L I V E R Y**



**COPYRIGHT NOTICE:** The copy law of the United States (Title 17 U.S. Code) governs the making of photocopies or other reproductions of copyrighted material. Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship or research". Note that in the case of electronic files, "reproduction" may also include forwarding the file by email to a third party. If a user makes a request for, or later uses a photocopy or reproduction for purposes in excess of "fair use", that user may be liable for copyright infringement. USC reserves the right to refuse to process a request if, in its judgment, fulfillment of the order would involve violation of copyright law. By using USC's Integrated Document Delivery (IDD) services you expressly agree to comply with Copyright Law.

**University of Southern California  
USC Libraries Integrated Document Delivery (IDD)  
(213) 740-4020  
[idd@usc.edu](mailto:idd@usc.edu)**

---

# Rapid #: -12200202

CROSS REF ID: **764056**

LENDER: **HLS :: Countway Library of Medicine**

BORROWER: **CSL :: Main Library**

TYPE: Book Chapter

BOOK TITLE: Autism spectrum disorders in infants and toddlers : diagnosis, assessment, and treatment / edited by Katarzyna Chawarska, Ami Klin, Fred R. Volkmar

USER BOOK TITLE: Autism spectrum disorders in infants and toddlers : diagnosis, assessment, and treatment /

CHAPTER TITLE: Controversial Treatments

BOOK AUTHOR: Smith and Wick

EDITION: 1

VOLUME:

PUBLISHER: Guilford Press

YEAR: 2008

PAGES: 243-273

ISBN: 9781593856496

LCCN:

OCLC #: 180195552

Processed by RapidX: 8/29/2017 2:29:45 PM



This material may be protected by copyright law (Title 17 U.S. Code)

4 Rapid #: -12200202



Odyssey  
IP: 206.107.42.158/ILL



Status	Rapid Code	Branch Name	Start Date
New	CSL	Main Library	08/28/2017 06:27 PM
Pending	HLS	Countway Library of Medicine	08/28/2017 06:29 PM
Batch Not Printed	HLS	Countway Library of Medicine	08/28/2017 10:48 PM

**CALL #:** WM 203.5 A93849 2008

**LOCATION:** HLS :: Countway Library of Medicine ::  
Countway Medicine

TYPE: Book Chapter  
BOOK TITLE: Autism spectrum disorders in infants and toddlers : diagnosis, assessment, and treatment / edited by Katarzyna Chawarska, Ami Klin, Fred R. Volkmar  
USER BOOK TITLE: Autism spectrum disorders in infants and toddlers : diagnosis, assessment, and treatment /  
HLS CATALOG TITLE: Autism spectrum disorders in infants and toddlers  
CHAPTER TITLE: Controversial Treatments  
BOOK AUTHOR: Smith and Wick  
EDITION: 1  
VOLUME:  
PUBLISHER: Guilford Press  
YEAR: 2008  
PAGES: 243-273  
ISBN: 9781593856496  
LCCN:  
OCLC #: 180195552  
CROSS REFERENCE ID: [TN:764056][ODYSSEY:206.107.42.158/ILL]  
VERIFIED:

**BORROWER:** CSL :: Main Library



This material may be protected by copyright law (Title 17 U.S. Code)  
8/28/2017 10:48:36 PM

## CHAPTER 9

---

# Controversial Treatments

TRISTRAM SMITH  
JENNIFER WICK

Children with autism spectrum disorder (ASD) often receive controversial treatments—interventions that are popular despite an absence of scientific or theoretical support. As many as one-third of all newly diagnosed children with ASD participate in such treatments (Levy, Mandell, Merhar, Ittenbach, & Pinto-Martin, 2003). Many others start soon after they begin conventional therapies such as behavioral or educational services, and some undergo multiple ones (Smith & Antolovich, 2000), which may continue into adolescence (Witwer & Lecavelier, 2005). The use of controversial treatments for children with ASD is a long-standing issue (Rimland, 1964), and the number of different treatments and their rate of use have grown over time (Levy & Hyman, 2003).

The most common controversial treatments for children with ASD are sensory-motor therapies such as auditory integration training, bonding therapies such as Options (also called Son-Rise; Kaufman, 1976), and several forms of complementary and alternative medicine (CAM) interventions such as vitamin therapies and special diets. The proliferation of controversial treatments for children with ASD is probably due to many factors. Among them is that the precise etiology or etiologies of ASD remain unknown, fueling speculation and debate about possible causes and remedies (Levy & Hyman, 2005). Another is that ASD is a complex behavioral syndrome with many areas of need, each of which is potentially a focus of intervention (Lovaas & Smith, 2003). Moreover, caregivers may be eager to try a variety of treatments in search of a favorable outcome for their children. Their hopes may be high because, in some cases,

the onset of ASD occurs after a period of apparently typical development (Luyster et al., 2005), and children may be free of obvious physical abnormalities and retain isolated areas of age-appropriate skills. Reports of children who improve markedly may add to caregivers' hopes (e.g., Seroussi, 2000). In addition, caregivers often feel a sense of urgency, which may be fueled by the significant behavioral difficulties associated with ASD and the stress on caregiver-child relationships arising from a disorder characterized above all by impaired reciprocal social interaction (Bouma & Schweitzer, 1990; Hoppes & Harris, 1990).

Caregivers may hear more about controversial treatments than about treatments with rigorous, scientific evidence for safety and efficacy. Controversial treatments attract far more media publicity than evidence-based treatments, which include behavioral and educational interventions (Lord et al., 2002) and psychopharmacological therapies (McCracken et al., 2002; Research Units on Pediatric Psychopharmacology Autism Network, 2005). Moreover, controversial treatments are frequently touted as cures, whereas evidence-based treatments yield only limited improvement, as they increase adaptive functioning for most children with ASD but do not eliminate the disorder. Some controversial treatments are relatively straightforward to implement; in contrast, evidence-based treatments are hard to obtain in many communities because they require supervision from highly trained professionals and may be expensive.

Because all of these factors are likely to persist into the foreseeable future, practitioners and families can expect controversial treatments for children with ASD to remain popular. Therefore, to make informed decisions, it is essential to be able to distinguish controversial from established treatments and to be aware of the most common controversial treatments. To resolve controversies and advance the field, the scientific community must identify constructive ways to respond to advocates of controversial treatments, and practitioners and families must find ways to work together when controversial treatments are being considered for a child with ASD.

## **DISTINGUISHING CONTROVERSIAL FROM ESTABLISHED TREATMENTS**

### ***Standards of Evidence***

The only evidence for many controversial treatments consists of subjective information such as case reports, anecdotes, testimonials from parents or practitioners, and surveys. Reports that a child improved or that families gave high marks for a treatment in a survey are encouraging and may indicate that a treatment deserves further study. Unfortunately, this is not proof that the treatment is effective. Many other explanations are plausi-

ble. For example, additional interventions that the children were concurrently receiving, such as behavioral and educational services, may account for favorable outcomes. Furthermore, as children grow up, they may develop new abilities regardless of treatment. It is even possible that reported improvements can reflect parents' or practitioners' desires to see gains, rather than real progress.

Scientific studies incorporate methodologies that make it possible to test whether a treatment is truly associated with improved outcomes. For instance, participants may be randomly assigned to two groups. One group receives the treatment, and the other is untreated; then the outcomes of the two groups are statistically compared. This design, called a **randomized clinical trial (RCT)**, can offer the strongest test of whether a treatment is effective. The randomization maximizes the probability that children in the treatment group are similar to those in the no-treatment group prior to intervention. If the groups are similar prior to treatment but differ afterward, the posttreatment difference is likely to be attributable to the intervention. Optimally, an RCT includes a large number of children in each group (at least 20, often considerably more) so that the statistical analyses have adequate power to detect differences in outcome between groups. It may also include multiple treatment sites and practitioners to assess the consistency of results at different sites, with different personnel.

Another appropriate research strategy is the use of single-case designs. These designs involve **comparing a baseline phase**, in which an individual receives no treatment, with one or more intervention phases in which treatment is provided to the individual. Data are collected continuously on the outcome measure. If scores on the outcome measure consistently improve during intervention relative to baseline, one may conclude that the treatment was effective for that individual. However, because the design involves only one individual, multiple studies by independent investigators are required to confirm the findings. A series of single-case studies may need to be followed by an RCT in order to test the treatment with **a sufficiently large number of individuals** (Smith et al., 2007).

In both RCTs and single-case studies, standardized measures such as the Autism Diagnostic Interview—Revised (ADI-R; Rutter, LeCouteur, & Lord, 2003) and the Autism Diagnostic Observation Schedule—Generic (ADOS-G; Lord, Rutter, DiLavore, & Risi, 2001) should be used to confirm the diagnosis. In addition, investigators should show that the outcome measures are valid indicators of improvement, and the measures should reflect readily observable gains in functioning such as increased communication or reduced aggression, rather than vague constructs such as "greater focus" or "improved sense of self." Moreover, to ensure unbiased data collection, individuals who are unaware of the purpose of the study or the children's treatment histories should administer and score the measures. Assessments

should also be conducted to ascertain whether treatment was delivered as intended, in keeping with a standard protocol or set of procedures.

When possible, intervention should be administered in a double-blind, placebo-control design. In this approach, children and practitioners are unaware of whether the children are receiving treatment or a placebo. For example, in a study of a medication or vitamin therapy, the pills that contain the active ingredient can be made identical to placebo pills. Investigators can postpone telling the children and practitioners which pill the children received until the completion of the study. Although this strategy is not viable for most behavioral or educational studies because the interventions cannot be disguised, it is feasible for most CAM treatments.

Table 9.1 presents a standard system for rating the evidence from scientific studies and shows that anecdotal reports are considered the weakest form of evidence, and favorable results from multiple studies that incorporate strong designs constitute the strongest evidence. When only anecdotal evidence is available, a treatment is considered to be essentially unproven; if studies were conducted, they could find that the treatment was helpful, harmful, or neither. Families and practitioners should consider such treatment experimental and should be very cautious about implementing it (or decide not to try it). However, when multiple, well-designed studies indicate that a treatment is effective, one can be confident that the treatment really is effective. Table 9.2 summarizes the criteria for a strong scientific study.

**TABLE 9.1. Levels of Evidence for the Effectiveness of a Treatment**

Grade	Criteria
I	Evidence from studies of strong design, with minor flaws at most and free from serious doubts about bias. Results are both clinically important and consistent. Results are free from concerns about generalizability. Studies with negative results have sufficiently large samples to have adequate statistical power.
II	Evidence from studies of strong design, but there is some uncertainty owing to inconsistencies in findings, or concern about generalizability, bias, research design flaws, or sample size (for negative findings, again). OR, consistent evidence, but from studies of weaker design.
III	Evidence from a limited number of studies of weaker design. Studies with strong design have not been done or are inconclusive.
IV	Support solely from informed professional commentators based on clinical experience without substantiation from the published literature.

*Note.* Adapted from Joint Commission Resources. (2000). Copyright 2000 by Joint Commission Resources. Adapted by permission.

**TABLE 9.2. Characteristics of Scientifically Sound Studies on Treatment**

- 
1. Participants are assigned randomly to groups (or use of single-subject experimental designs, with multiple replications by independent investigators).
  2. The study includes a large enough number of participants to support meaningful statistical analyses.
  3. Diagnosis is based on standardized measures.
  4. Validated outcome measures relating to improvements in functioning are collected.
  5. Measures are collected in an unbiased manner.
  6. Assessments are conducted to determine whether treatment adheres to a standard, predetermined set of procedures.
  7. When possible, the study is performed double-blind (participants and practitioners are unaware of whether the treatment or a placebo is being provided).
- 

### ***Plausibility***

Although scientific evidence is the primary criterion for evaluating a treatment, the theoretical basis of the treatment is another important consideration. To be plausible, a treatment must address a problem known to be associated with ASD, and its mechanism for producing change must be consistent with principles of behavior or biology. For example, Floortime is an intervention that involves playfully obstructing children's activities (Greenspan & Wieder, 1999). Although it has not been evaluated in studies with strong scientific designs (Greenspan & Wieder, 1997), it is viewed as a possibly effective intervention (National Research Council [NRC], 2001). Its purpose is to improve reciprocal social interactions, which are a major area of difficulty for children with ASD, via sustained back-and-forth communication during unstructured games. Playful obstruction is similar to a scientifically validated instructional method called incidental teaching (Hart & Risley, 1980), which is often a useful component of intervention programs for children with ASD. In contrast, "gentle teaching" is a therapy that is said to provide "unconditional and authentic valuing" of individuals with ASD in order to facilitate bonding or attachment to caregivers (McGee & Gonzales, 1990). However, most individuals with ASD already display attachment to caregivers (Sigman & Mundy, 1989), and it is unclear as to what unconditional and authentic valuing is or how it would be beneficial. Because it does not address a known problem in ASD and does not include interventions known to change behavior, gentle teaching is not usually regarded as a plausible treatment.

These criteria are also applicable to biomedical interventions. For example, mood swings are a problem for some children with ASD. Psychotropic medication may be a reasonable intervention even if the medication has not been studied in children with ASD. Because of government regulations, all medications undergo extensive testing for safety and efficacy before becoming available in clinical practice. Psychotropic medications alter the function of neurotransmitters in the brain, and some have been shown to be effective in reducing mood swings associated with disorders other than ASD. For these reasons, such medications are potentially effective for children with ASD, though close monitoring by the prescribing physician is necessary. In contrast, although ASD is known to be a neurological disorder that affects brain development, many CAM interventions focus on entirely different parts of the body such as the gastrointestinal system. It is unclear whether individuals with ASD are at any greater risk than other individuals for such problems. It is also unknown whether interventions such as hormone injections or dietary changes are safe or effective in addressing these problems if they do exist, and whether improvement in gastrointestinal functioning is relevant to the underlying neurological difficulties in ASD. Thus, the theoretical basis for many CAM interventions is often questionable.

### **Potential “Red Flags”**

Unfortunately, families and professionals often view particular treatments as having support from scientific studies and theories even when the consensus of the scientific community advises otherwise (Smith & Antolovich, 2000). Treatments may be pseudoscientific (described as proven and well-grounded in established theory yet lacking any such basis), and it may be difficult to distinguish between scientific and pseudoscientific approaches. However, one study identified a set of 10 “red flags” that may increase nonspecialists’ ability to spot pseudoscientific treatments (Finn, Bothe, & Bramlett, 2005; see Table 9.3):

1. *Does the evidence in support of the treatment rely on personal experience and anecdotal accounts?* As discussed, anecdotes may suggest that scientific testing of a treatment would be worthwhile but in themselves are weak evidence that the treatment is effective.
2. *Is the treatment approach disconnected from well-established scientific models or paradigms?* As noted, a treatment should address problems known to be associated with ASD and should be consistent with principles of behavior and biology.
3. *Is the treatment unable to be tested or disproved?* To qualify as scientific, assertions about treatment effects must be stated in such a way that direct observation and experiments can either confirm or falsify them.

**TABLE 9.3. Red Flags for Identifying a Treatment as Pseudoscientific**

- 
1. Does the evidence in support of the treatment rely on personal experience and anecdotal accounts?
  2. Is the treatment approach disconnected from well-established scientific models or paradigms?
  3. Is the treatment unable to be tested or disproved?
  4. Does the treatment remain unchanged even in the face of contradictory evidence?
  5. Is the rationale for the treatment based only on confirming evidence, with disconfirmatory evidence ignored or minimized?
  6. Are the treatment claims incommensurate with the supporting evidence for those claims?
  7. Are the treatment claims unsupported by evidence that has undergone critical scrutiny?
  8. Is the treatment described by terms that appear to be scientific but upon further examination are determined not to be?
  9. Is the treatment based on grandiose claims or poorly described outcomes?
  10. Is the treatment claimed to make sense only within a vaguely described holistic framework?
- 

*Note.* Adapted from Finn, Bothe, and Bramlett (2005). Copyright 2005 by the American Speech-Language-Hearing Association. Adapted by permission.

Otherwise, the credibility of the treatment depends solely on the authority of its developer. However, assertions about controversial treatments are often untestable and therefore pseudoscientific. For example, the developer of one controversial treatment contended that any intervention for children with ASD would be impossible to study because treatment "cannot observe the rigors of a 'scientific' experiment since it must, in its course, pursue the vagaries of life which are nothing if not unpredictable" (Bettelheim, 1967, p. 6). Proponents of another controversial treatment maintained that negative research findings could never be used as evidence against the intervention because the presence of an objective observer (as required for research) disrupted the therapeutic relationship so severely that treatment gains were lost (Biklen & Cardinal, 1997).

4. *Does the treatment remain unchanged even in the face of contradictory evidence?* Established treatments such as behavioral interventions continually evolve as a result of new research findings. However, many controversial treatments originated many years ago and are still implemented in essentially their original form, without revisions based on scientific advances (see, e.g., Kaufman, 1976).

5. *Is the rationale for the treatment based only on confirming evidence, with disconfirmatory evidence ignored or minimized?* Scientific evaluation of a

treatment requires consideration of all evidence from relevant well-designed studies, including both positive and negative results. However, advocates of controversial treatments sometimes focus only on supporting evidence. For example, proponents of vitamin therapies sometimes cite a large number of uncontrolled studies that appear to support these therapies but do not cite relevant RCTs, all of which so far indicate that the therapies are not effective (see, e.g., Rimland, 2000).

6. *Are the treatment claims incommensurate with the supporting evidence for those claims?* Advocates of a controversial treatment may recommend the treatment for children with ASD solely on the basis of anecdotal information. They also may divert attention away from this weak evidence by criticizing other treatments, arguing that skepticism about their treatment reflects opposition from a narrow-minded establishment (Rimland, 1992) or insisting that scientific tests of the treatment are superfluous (Biklen & Cardinal, 1997).

7. *Are treatment claims unsupported by evidence that has undergone critical scrutiny?* Before publication in a scholarly journal, reports of scientific studies undergo careful peer review. The report is read by several experts, whose identities are usually withheld from the authors of the report so that they can give honest feedback. The experts critique the adequacy of the research methodology, soundness of the conclusions, and contribution to scientific knowledge. Based on the experts' critique, an editor makes a recommendation for or against publishing the report. Although not a perfect process, peer review increases the likelihood that published reports are reliable and useful sources of information. Many controversial treatments, however, do not receive this kind of scrutiny and are instead publicized through press releases to the popular media, websites, advertisements, workshops, and the like.

8. *Is the treatment described by terms that appear to be scientific but upon further examination are found not to be scientific at all?* Controversial treatments often use scientific-sounding jargon to describe ideas that lack a scientific foundation. For example, the developer of sensory integration therapy (SIT) asserted, "Sensations [from activities such as riding a scooter board] and the resulting movements leave memories stored in his brain, and so the child gradually makes his body percept more accurate" (Ayres, 1979, p. 143). However, no direct evidence of changes in the brain or behavior is provided. Thus, despite the technical terms, the reported benefits are merely the subjective impressions of one practitioner, rather than the results of scientific study.

9. *Is the treatment based on grandiose claims or poorly described outcomes?* Many controversial treatments are said to produce a "cure," "miracle," "breakthrough," "transformation," or "revolution." Such unabashed self-promotion should be a warning that marketing rather than science is the main impetus for the treatment. Outcomes for other treatments are

described in fuzzy terms. For example, in addition to improving "body percept," SIT is said to help children pull their lives together, develop sensory maps, and improve postural and equilibrium responses (Ayres, 1979, pp. 143-147). Because these outcomes are so nebulous, it is impossible to test whether the intervention achieves them.

10. *Is the treatment claimed to make sense only within a vaguely described holistic framework?* Controversial treatments are often portrayed as "natural," "organic," "purifying," or "cleansing." They may also be depicted as designed to help the "whole person" through processes such as "unconditional and authentic valuing" (as in gentle teaching). The use of such feel-good words cannot substitute for a clear, concrete explanation of how the treatment works.

## COMMON CONTROVERSIAL TREATMENTS FOR ASD

### **Sensory-Motor Therapies**

Children with ASD often react incongruously to sensory input. They may be so unresponsive when their names are called that caregivers wonder whether they are deaf, yet they may cover their ears and appear pained in response to other sounds such as noises made by household appliances (Kanner, 1943). Many practitioners infer that these reactions are a sign of a sensory dysfunction that causes children with ASD to be either underaroused or overaroused by everyday sounds, sights, and other environmental events. Many also suggest that children with ASD have a motor apraxia—difficulty in producing an adaptive response to sensory input despite having the desire and physical ability to do so. It remains unknown whether these hypotheses are correct, as research has yielded conflicting findings regarding the presence or absence of sensory dysfunction and apraxia in children with ASD (Rogers & Ozonoff, 2005). It is therefore unclear whether or how to intervene for these proposed areas of difficulty. Nevertheless, many children with ASD receive sensory-motor treatments.

### **Sensory Integration Therapy**

Sensory integration therapy (SIT) is designed to address sensory dysfunction through activities that provide vestibular, proprioceptive, or tactile sensations (Ayres, 1972, 1979). Vestibular activities focus on the movement of the body through space and include swinging, rolling, jumping on a trampoline, and riding on scooter boards. Proprioceptive activities emphasize stimulating the muscles and joints and may consist of "smooshing" the child between gymnasium pads or pillows to provide "deep pressure" or providing "joint compression" by repeatedly tighten-

ing the individual's joints at the wrist or elbow. Tactile activities pertain to the child's responses to being touched; examples include brushing the child's body and providing textured toys for the child to use during play.

The application of a "sensory diet" is a related clinical practice in which practitioners develop individualized plans to meet the presumed sensory needs of the child with ASD. Such a plan may include a schedule for having children play gross motor games, wear weighted vests or wrist bands, put on a body sock, brush their gums and massage their faces, and modify their environment (e.g., adjusting the lighting) in order to improve or alter arousal states and affect (Alhage-Kientz, 1996).

SIT practitioners are usually occupational therapists (OTs). These practitioners typically conduct 30- to 60-minute sessions one to three times per week and often direct parents and paraprofessionals such as classroom aides to carry out the intervention at other times throughout the day (Bundy & Murray, 2002). Most OTs view SIT as a standard part of treatment for children with ASD (Watling, Dietz, Kanny, & McLaughlin, 1999), and SIT takes place in a variety of settings, including many public schools, residential placements, and independent agencies (Smith, Mruzek, & Mozingo, 2005).

Four published reports contained objective data on SIT for children with autism: one case study (Ray, King, & Grandin, 1988), two uncontrolled studies with small samples and no comparison groups (Case-Smith & Bryan, 1999; Linderman & Stewart, 1998), and one study with a larger sample that failed to demonstrate gains in speech following participation in sensory activities (Reilly, Nelson, & Bundy, 1984). Dawson and Watling (2000) commented, "There exist so few studies that conclusions cannot be drawn" (p. 419).

### *Auditory Integration Training*

Auditory integration training (AIT; Berard, 1993) is based on the view that the hypersensitive hearing displayed by some children with ASD causes them to avoid social interactions and tune out what others say. AIT practitioners are human service professionals who complete a training workshop and obtain certification. The Tomatis and Berard methods are the most influential forms of AIT. Both begin with an audiogram (observations by an AIT practitioner) to determine the frequencies at which a child's hearing appears to be too sensitive. Children then listen to music played through a device that filters out the threshold frequencies identified by the audiogram. In the Tomatis method, children may also speak into a microphone as their own filtered speech is played back. This method typically involves 60–90 hours of intervention in sessions lasting 1–3 hours. The Berard method involves a total of 10 hours of intervention over a 2-week period. Several small RCTs of AIT have obtained mixed results, with some studies showing benefits and others failing to do so

(Sinha, Silove, Wheeler, & Williams, 2005). Additional studies are needed to evaluate AIT more conclusively.

### *Facilitated Communication*

Facilitated communication (FC; Biklen, 1993) derives from the hypothesis that individuals with ASD have a motor apraxia that prevents them from expressing themselves despite a sophisticated understanding of spoken and written language. To overcome this conjectured problem, trained facilitators (professionals or nonprofessionals who complete a workshop on the treatment) hold a person's hands, wrists, or arms to spell messages on a keyboard or a board with printed letters. FC practitioners assert that this intervention suddenly and dramatically increases appropriate language displayed by individuals with ASD. Investigators have evaluated this assertion in numerous studies by testing whether the facilitator or the individual with ASD produced the communications made during FC. For example, in some evaluations, the facilitators and children were simultaneously but separately asked questions. Sometimes the questions were the same for both the facilitators and the children; other times, they differed. When the questions were the same, the child's answers were often correct; but when the questions were different, most answers were in response to the facilitator's questions, not the child's. This evidence, replicated across several hundred children with ASD, shows that the facilitators rather than the individuals with ASD control the communication and that FC does not improve language skills (Mostert, 2001). Therefore, FC is an inappropriate intervention for individuals with ASD.

### *Rapid Prompting Method*

In the rapid prompting method (RPM), practitioners attempt to compensate for the hypothesized sensory overload and apraxia in children with ASD by continually speaking and requesting responses so that the children stay attentive (Mukhopadhyay, 2003). To encourage successful responding, they initially focus on having children observe correct responses. As the children progress, practitioners begin to ask children to point to correct responses. Subsequently, they teach children to spell answers on a keyboard or write them down, often attaching a rubber band to the children's hands to help them hold the pen or pencil. No scientific studies have evaluated RPM.

### *Vision Therapy*

Many children with ASD have poor eye contact. Some also flap their hands or fingers in front of their eyes repeatedly, look at objects out of the

corners of their eyes, and display unusually intense interest in visual stimuli such as spinning objects. Vision therapy is intended to address these problems through the use of tinted eyeglasses, prisms, or eye exercises (Kaplan, Edelson, & Seip, 1998). Tinted eyeglasses, such as Irlen lenses, are thought to reduce "perceptual stress" by filtering out certain colors, decreasing glare, or dimming the light. Prisms are used to displace children's field of vision to the left, right, up, or down. Eye exercises emphasize relaxing the eyes or activities such as following a series of blinking lights, gazing at a string of objects, or working on hand-eye coordination. There are no studies on vision therapy for children with ASD. Studies of other populations such as children with learning disabilities indicate that it is likely to be ineffective (Rawstron, Burley, & Elder, 2005).

### ***Bonding Therapies***

Although impaired reciprocal social interaction is a central feature of ASD, most children with ASD form attachments to their caregivers. Like typically developing children, children with ASD may become distressed upon separation, are eager to see caregivers when reunited, and stay nearer to caregivers than to unfamiliar adults (Sigman & Mundy, 1989). Nevertheless, a number of interventions are intended to facilitate attachment or bonding between individuals with ASD and their caregivers. In holding therapy (Tinbergen & Tinbergen, 1983; Welch, 1987), the mother forcibly holds the child close to her so as to cause "the autistic defense . . . to crumble" (Welch, 1987, p. 48). Options (also called Son-Rise) offers individualized, loving attention to a child in a residential setting for most of the child's waking hours (Kaufman, 1976). As described earlier, "gentle teaching" focuses on providing unconditional support and encouragement to individuals with ASD (McGee & Gonzales, 1990). None of these therapies have been evaluated in scientific studies on children with ASD, although one study suggests that gentle teaching may be nonbeneficial for children with other developmental disabilities (Mudford, 1995). Given that attachment difficulties are not characteristic of most children with ASD, the theoretical rationale for bonding therapies is suspect.

### ***CAM Interventions***

#### *Diets*

Many children with ASD have idiosyncratic eating habits: Some are very picky about what they eat, and others crave large amounts of certain foods. A few professionals suggest that these behaviors reflect a serious underlying problem, namely, a difficulty in tolerating certain substances found in various foods. They argue that eliminating these substances from

children's diets may alleviate physical discomfort, which may lead to an improvement in their behavior (Reiten, 1987).

The most common special diet for children with ASD is the gluten-free-casein-free (GfCf) diet. Gluten is an elastic protein in wheat that gives cohesiveness to dough. Casein is a protein in milk, cheese, and other dairy products. Numerous parents and professionals aver that the GfCf diet cures a few people with ASD and helps many others. The diet reportedly improves communication, social interaction, and sleep patterns while reducing autistic behaviors and digestive problems such as diarrhea. These benefits are said to occur rapidly, often within a few days of starting the diet (Seroussi, 2000).

Supporters of the GfCf diet propose that people with autism have a metabolic disorder that causes them to break down gluten and casein into opioids, which are peptides produced by the body and found in drugs such as morphine (Shattock, Kennedy, Rowell, & Berney, 1990). They also suggest that people with autism have leaky guts, which allow some of the opioids to escape from the digestive system and circulate to other parts of the body, including the brain (Horvath, Papadimitriou, Rabsztyń, Drachenberg, & Tildon, 1999). According to the theory, these problems create an addiction to foods that contain gluten and casein, as evidenced by the strong cravings that people with autism often have for such foods. The cravings are thought to be symptomatic of pervasive toxic effects in the brain, thus resulting in autism. The intended purpose of the GfCf diet is to reverse the damage by detoxifying the brain.

Although some investigators have presented evidence that people with autism overproduce opioids and have leaky guts (Reichelt, Knivsberg, Nodland, & Lind, 1994), other investigators have failed to replicate these findings (Williams & Marshall, 1992). Only two small RCTs have evaluated the GfCf diet. Knivsberg, Reichelt, Hoien, and Nodland (2002) found that although the diet did not significantly improve cognitive, language, or motor skills, it may have reduced autistic behaviors such as repetitive statements. Elder et al. (2006) reported that the diet did not produce significant changes for children with autism in their study. Additional study of the theoretical basis and efficacy of the GfCf diet is an important area for research (Millward, Ferriter, Calver, & Connell-Jones, 2004). Because the removal of gluten and casein may compromise a child's nutritional intake, dietary counseling is recommended for families who place their children on the diet (Levy & Hyman, 2003).

### *Vitamin Therapies*

A few investigators assert that some children with autism require much higher doses of certain nutrients than can be obtained from any traditional diet (Rimland, 1987). According to these investigators, children

with autism have a genetic or acquired medical disorder (as yet unspecified) that increases their need for specific nutrients. Research based on this hypothesis has centered on the use of a combination of vitamin B<sub>6</sub> (pyridoxine) and magnesium. B<sub>6</sub> is a chemical whose primary function is to aid in protein digestion; magnesium is a mineral that helps build bones, maintain nerve and muscle cells, and enhance the function of various enzymes in the body. Three small-scale RCTs indicated that B<sub>6</sub> with magnesium is ineffective in changing behavior (Findling et al., 1997; Kuriyama et al., 2002; Tolbert, Haigler, Waits, & Dennis, 1993), but further study may be warranted (Nye & Brice, 2005).

Other common vitamin therapies include (1) dimethylglycine (DMG), which assists in the metabolism of amino acids and other substances, (2) vitamin A (often in tablets of fish oil or omega-3 fatty acids), (3) vitamin B<sub>12</sub> (folic acid or folate), and (4) vitamin C. The theoretical basis for these vitamin therapies is unclear, and none have been evaluated in well-designed studies of children with ASD.

### *Treatment of Infections*

Some researchers contend that children with ASD may have impaired immune systems (see Lawler, Croen, Grether, & van de Water, 2004, for a review), though evidence for such an impairment remains inconclusive. One small study indicated that an antibiotic, vancolycin, may increase the amount of communication initiated by children with ASD (Sandler et al., 2000), but until this finding is replicated, it is premature to recommend antibiotic treatment. Antifungal or antiyeast medications such as mycostatin (Nystatin) or fluconazole (Diflucan) are sometimes also prescribed. However, well-designed studies have not been conducted to examine the effectiveness of these medications in changing the behavior of children with ASD (Levy & Hyman, 2005). Moreover, the diagnostic tests used to identify fungal or yeast infections have not been empirically validated and must be viewed with skepticism. Intravenous injections of immunoglobulin treatments (IV-Ig) have been proposed as a way to improve immune functioning but have also not been evaluated in well-designed studies (Levy & Hyman, 2005).

### *Immunizations and Nonvaccination*

Much concern has arisen among the general public that vaccines cause autism (Kennedy, 2005), and this concern has significant public health implications, as it has apparently contributed to a reduction in vaccination rates in many countries (Fleck, 2003). Initially, it was suggested that some vaccines, particularly diphtheria-tetanus-pertusis (DTaP) and measles-mumps-rubella (MMR), may trigger out-of-control infections or immune

responses, leading to brain damage and the onset of autism (Coulter, 1990). This view was largely set aside and replaced with a new hypothesis, that the MMR vaccine may cause bowel inflammation, hindering the absorption of essential vitamins and nutrients (Wakefield et al., 1998). The Wakefield et al. hypothesis generated enormous publicity and led to numerous studies evaluating the putative links among the MMR vaccine, bowel inflammation, and ASD. A review of 31 well-designed studies found no evidence for the proposed links (Demicheli, Jefferson, Rivetti, & Price, 2005). For instance, a Japanese city stopped administering the MMR vaccine in 1993, but the prevalence of ASD did not decrease after the vaccine's removal (Honda, Shimzu, & Rutter, 2005). Further weakening the MMR hypothesis, 10 of the 13 authors of the Wakefield et al. (1998) report retracted their initial conclusion that findings in the report showed a possible connection between MMR and ASD (Murch et al., 2004). Thus, many studies have failed to find an association between the MMR vaccine and ASD (Demicheli et al., 2005).

As evidence began to accumulate against a link between the MMR vaccine and ASD, another hypothesized connection between vaccines and ASD was advanced: Bernard, Enayati, Redwood, Roger, and Binstock (2000) and subsequent writers proposed that vaccines containing thimerosal, which is a mercury compound used as a preservative, may cause autism. In 1999, the U.S. Food and Drug Administration (FDA) mandated the removal of this substance from all childhood vaccines, including DTaP, haemophilus influenza type b (Hib), and hepatitis B. (The MMR vaccine never contained thimerosal; some influenza vaccines continue to include trace amounts.) This action is sometimes cited as an indication that the FDA had evidence of a link between thimerosal and ASD or other conditions (Kennedy, 2005). However, studies indicate that thimerosal is *not* associated with ASD (Institute of Medicine, 2004). Doses of thimerosal in vaccines are excreted quickly and appear to pose little risk (Pichichero, Cernichiari, Lopreiato, & Treanor, 2002). More generally, these studies confirm that vaccines are safe and that withholding them poses much greater risk than administering them to children with or without ASD.

### *Secretin*

Secretin is a hormone that is secreted by the lining of the duodenum (part of the small intestine) and assists with food digestion. In 1998, news stories publicized a report that intravenous injections of secretin led to symptom improvement in three children with ASD (Horvath et al., 1998). Some news stories also described a child whose ASD was said to be cured by secretin. Subsequently, secretin attracted a great deal of interest from families and practitioners, and many researchers began to study it. Investigators discovered that secretin receptors resided in both the gut and the

brain and that secretin can cross the blood-brain barrier, indicating that it could potentially influence brain function (Levy & Hyman, 2005). However, an authoritative review identified 14 RCTs of secretin, all of which found secretin to be ineffective, and concluded, "There is no evidence that single or multiple dose intravenous secretin is effective and as such it should not currently be recommended or administered as a treatment for autism" (Williams, Wray, & Wheeler, 2005).

### *Chelation*

Chelation therapy involves administering a substance that binds to metal ions so that the metal can be excreted from the body. The substance, called the chelating agent, can be administered intravenously, intramuscularly, orally, or rectally. With the increased interest in the (unproven) hypothesis that ASD is caused by exposure to mercury, chelation has become a common intervention for children with ASD. Chelating agents that are used for children with ASD include disodium versante ( $\text{Na}_2\text{-EDTA}$ ), calcium disodium versante ( $\text{CaNa}_2\text{-EDTA}$ ), dimercaptosuccinic acid (DMSA), sodium dimercaptopropanesulfonate (DMPS), and thiamine tetrahydrofurfyl disulfide (TTFD). However, none of these agents cross the blood-brain barrier in significant amounts; thus, their theoretical basis is dubious, as there is no mechanism by which any chelating agent could reverse the brain damage associated with ASD (Levy & Hyman, 2005). Only  $\text{Na}_2\text{-EDTA}$  and DMSA have been approved by the FDA to treat acute poisoning from heavy metals, and  $\text{Na}_2\text{-EDTA}$  is not effective in removing mercury from the body. These and other chelating agents have significant risks of side effects. For example, in August 2005, a 5-year-old boy died as a result of chelation therapy with intravenous  $\text{Na}_2\text{-EDTA}$  (Kane, 2006). Thus, although no RCTs have evaluated any form of chelation therapy for children with ASD, and although other chelating agents may not be as dangerous as  $\text{Na}_2\text{-EDTA}$ , this therapeutic approach appears implausible and unacceptably risky. It should not be used as a treatment for ASD.

### *Discussion*

Table 9.4 summarizes common controversial therapies and their intended outcomes. The preceding sections reveal that several of these therapies have undergone extensive evaluation in well-controlled studies (providing Grade I evidence, according to the criteria in Table 9.1) and have clearly been refuted: facilitated communication, secretin, and nonvaccination. Therefore, a strong recommendation can be made *against* implementing these treatments. Chelation, although not evaluated in well-controlled

**TABLE 9.4. Common Controversial Treatments for ASD**

Intervention	Example of method	Intended outcome
<b>Sensory-motor therapies</b>		
Sensory integration therapy	Repeated exposure to vestibular, proprioceptive, and tactile activities	Organize sensory input and reduce anxiety associated with hypersensitivity to sensations
Auditory integration therapy	Headphones to listen to filtered sound frequencies	Reduce sensitivity to sounds, thereby increasing social interaction and attentiveness
Facilitated communication	Physical support given by placing a practitioner's hand on the child's arm or hand; with support, child expresses ideas via picture board, typewriter, or computer	Overcome motor apraxia to enable communication
Rapid prompting method	Continuous verbal requesting in order to maintain attending behavior; children initially observe correct responses to requests, then are required to emit progressively more active responses	Compensate for sensory overload and apraxia to improve communication
Vision therapy	Use of tinted eyeglasses, prism lenses, or eye exercises	Improve eye contact and diminish repetitive behaviors that involve visual stimuli such as spinning objects
<b>Bonding therapies</b>		
Options or Son-Rise, holding therapy, gentle teaching	Giving unconditional loving attention to the child	Increase attachment to familiar adults
<b>CAM interventions</b>		
Diets	Removal of gluten and casein from the diet	Heal leaky gut and detoxify the brain of opioids
Vitamin therapies	Vitamin or nutritional supplements: vitamin B <sub>6</sub> + magnesium; DMG; vitamin A; vitamin B <sub>12</sub> (folate); vitamin C	Alter neurotransmitter levels to produce global improvements in behavior
Treatment of infections	Antibiotic or antifungal treatments; IV-Ig	Eliminate infectious disease, improve immune functioning

(continued)

**TABLE 9.4.** (*continued*)

Intervention	Example of method	Intended outcome
<b>CAM interventions (cont.)</b>		
Nonvaccination	Withholding vaccines such as MMR	Avoid bowel inflammation or metal toxicity to prevent ASD
Secretin	Intravenous injection	Alter activity of secretin receptors in gut and brain
Chelation	Oral or intravenous administration of a chelating agent such as DMSA or EDTA	Remove heavy metals such as mercury from the body to restore brain functioning

studies, has a faulty theoretical basis and an intolerable level of risk; as such, it is also an intervention to avoid. The remaining controversial therapies have received little or no scientific testing, leaving only Grade III or Grade IV evidence, as outlined in Table 9.1. These treatments have unknown effects, and families and practitioners should be cautious about them (either deciding not to implement them or monitoring them carefully). Some treatments, such as bonding therapies, are based on obsolete theories about ASD, and interventions such as some sensory-motor therapies, diets, and vitamins are based on unproven theories that may merit further research.

## **IMPLICATIONS FOR THE SCIENTIFIC COMMUNITY**

Ideally, the scientific community could settle controversies about treatments by providing evidence on their effectiveness or lack thereof. The reality, however, is somewhat more complicated. As detailed in the preceding section, controversial treatments are many and varied, and new ones continually emerge. Therefore, it is not feasible to evaluate all controversial treatments adequately. Even when a treatment has been studied extensively and found to be ineffective, some families and practitioners remain steadfast in their belief that the treatment is beneficial. For example, FC, secretin, and nonvaccination still have many ardent supporters in spite of devastating evidence against them. One study revealed that, despite being informed of the negative results from a secretin study in which they participated, 69% of families remained interested in receiving secretin as a treatment for their children with ASD (Sandler et al., 1999). This enduring support shows that the hope for effective interventions and

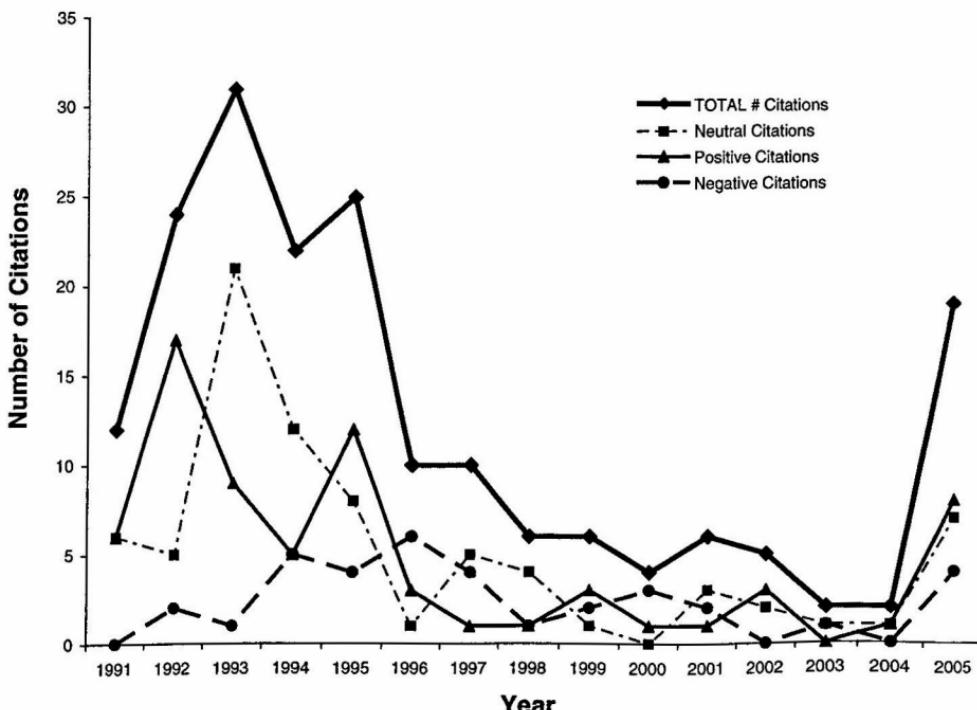
the appeal of pseudoscientific claims may be so strong that they override any amount of scientific data that researchers may produce.

Nevertheless, the scientific community can play a constructive role in responding to controversial treatments. Research that pertains to the theoretical basis of the treatments may be especially useful. For example, until the 1980s, many bonding therapies were proposed for children with ASD (discussed by Smith, 1993). However, with the increase in research during the 1980s regarding social deficits displayed by children with ASD, interest in bonding therapies may have waned as it became apparent that bonding was not a primary concern for most of these children. In contrast, unusual sensory-motor behaviors, which are also a central feature of ASD, have generated much less research, and no generally accepted scientific theory accounts for these behaviors (Rogers & Ozonoff, 2005). Perhaps as a result, sensory-motor and dietary interventions continue to proliferate. Other controversial treatments, particularly CAM interventions, are based in part on the belief that there is an epidemic of ASD and that recent changes in children's environments, such as the introduction of new vaccines or exposure to toxic substances, must be responsible. Although estimates of the prevalence of ASD have certainly increased since the 1980s (Fombonne, 2003), it remains unclear whether this increase reflects an actual rise in the prevalence in ASD or merely improved detection and broadened diagnostic criteria for the disorder. Extensive research is now under way to resolve this issue, and such investigations may influence the extent to which the belief in an autism epidemic continues to drive the development of new CAM interventions.

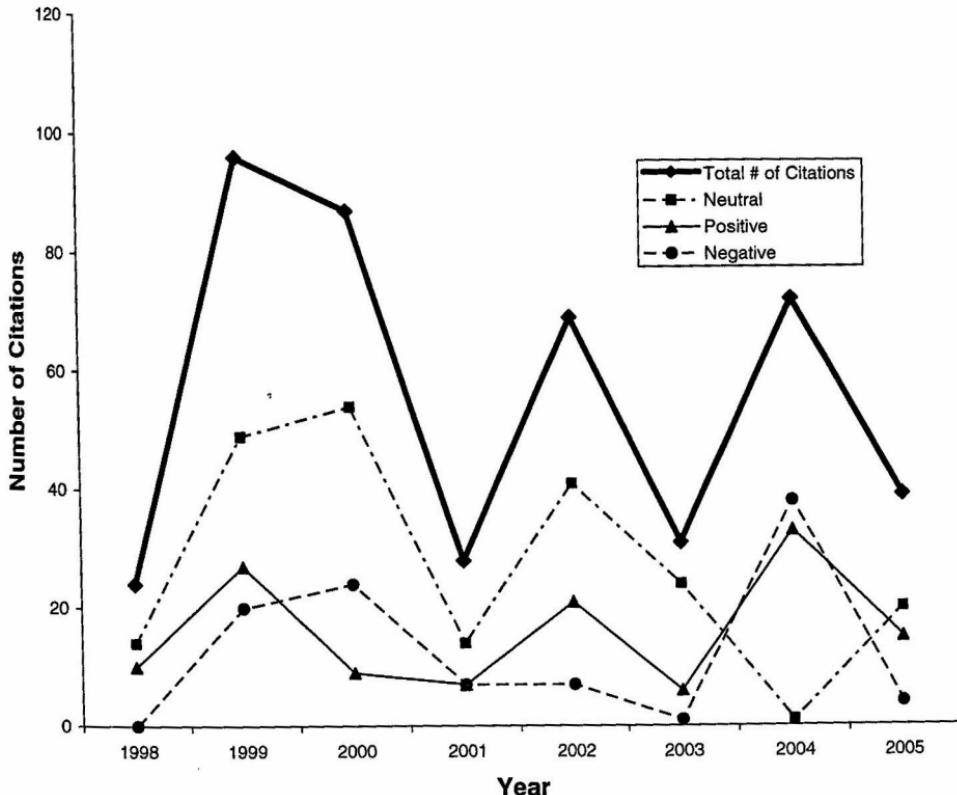
Scientific evaluations of treatments, as well as position statements by professional organizations based on these evaluations, can also have an effect on controversial treatments, albeit a limited one. For example, a search of the database Lexis/Nexis was conducted for reports on several controversial treatments in the popular media (newspapers and magazines, television, and radio); these reports were rated as having a positive, neutral, or negative stance toward a particular treatment. Figure 9.1 shows reports on FC. This intervention was virtually unknown prior to 1990 but suddenly became a topic of many favorable media reports in the early 1990s. Reports often described miraculous improvements in the communications made by children with ASD. From the start, scientists expressed skepticism about the validity of FC and responded quickly by conducting single-case studies of FC involving many children with autism. By 1994, studies had unequivocally shown FC to be ineffective (Green & Shane, 1994), and professional organizations presented position statements advising against its use (American Psychological Association, 1994). As shown in Figure 9.1, positive media references to FC sharply decreased at that time, suggesting that the studies and position state-

ments may have created doubts about the intervention. However, the reports remained mostly favorable and rose in frequency again in 2004, perhaps because a film on FC was nominated for an Academy Award that year. Thus, evidence from scientific evaluations did not put an end to public interest in FC, but did appear to have an impact on media coverage (perhaps only temporarily).

Figure 9.2 displays media reports on secretin, which attracted a flurry of publicity in 1998 when an article described favorable outcomes in three children with ASD. Within weeks, the National Institutes of Health (1998) issued a call for the scientific evaluation of secretin, and scientists responded with three RCTs published in 1999, all finding secretin to be ineffective. At that time, as revealed in Figure 9.2, skeptical media reports on secretin began to surface, but positive reports also continued to flourish. As with FC, negative research findings appear to have dampened enthusiasm about this treatment, though they did not eliminate it.



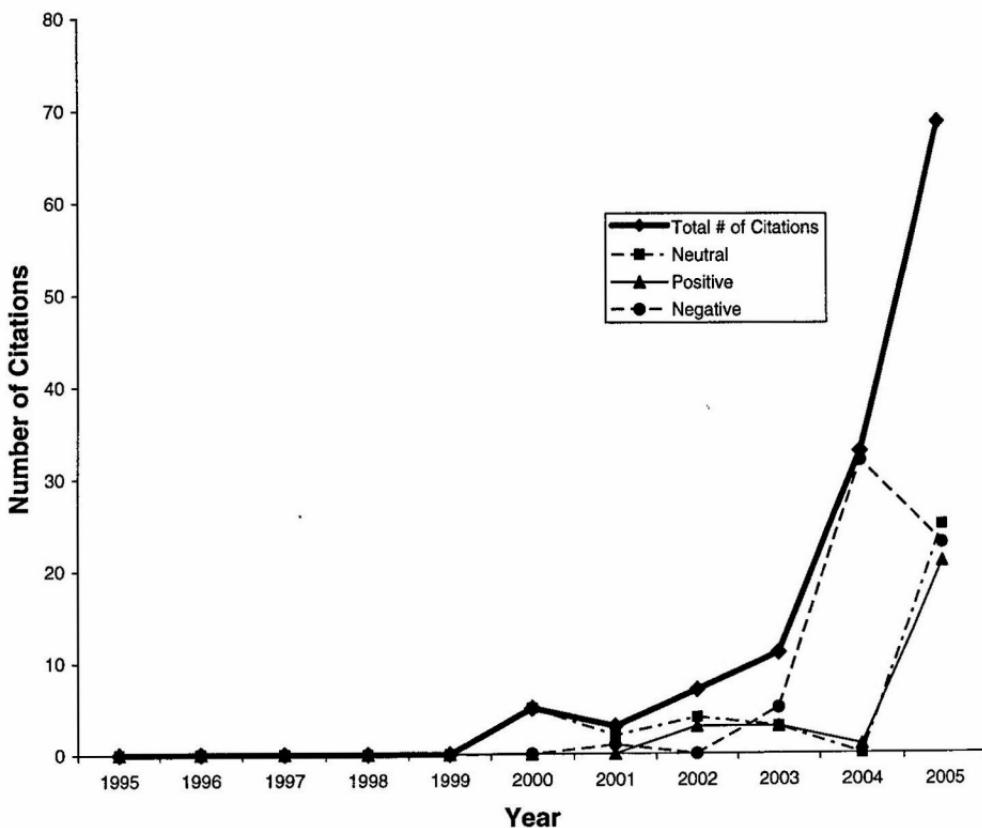
**FIGURE 9.1.** References to facilitated communication in the popular media (1991-2005).



**FIGURE 9.2.** References to secretin in the popular media (1997–2005).

The influence of research findings on public opinion may be enhanced by illustrating them with case examples. For example, media reports on FC supplemented discussions of research findings with demonstrations on television that the facilitators rather than the children with ASD were controlling the communication (Palfreman, 1993). As another example, the media report of a death resulting from chelation in 2005 was followed by a number of other media reports cautioning against this intervention, as shown in Figure 9.3. Many of these reports cited scientific evidence for the risks and limitations of chelation, in addition to commenting on the tragic death.

In sum, although not a perfect solution, research on characteristics of ASD, scientific evaluation of controversial treatments, and position statements by professional organizations can influence public interest in a treatment, particularly if presented in an accessible format (e.g., with case reports).



**FIGURE 9.3.** References to chelation therapy in the popular media (1995–2005).

### IMPLICATIONS FOR CLINICAL PRACTICE

Given the prevalence and durability of controversial treatments for ASD, practitioners who assess and treat children with ASD can neither ignore nor dismiss such treatments. Instead, they must anticipate that the treatments will be appealing to many families. To be in a position to help families make informed decisions, practitioners can encourage families to discuss controversial treatments by asking direct, nonjudgmental questions about treatments that families have tried or considered. Practitioners can also show an awareness of and compassion for the many understandable motives that families may have for trying unproven or even disproven approaches (Committee on Children with Disabilities, 2001).

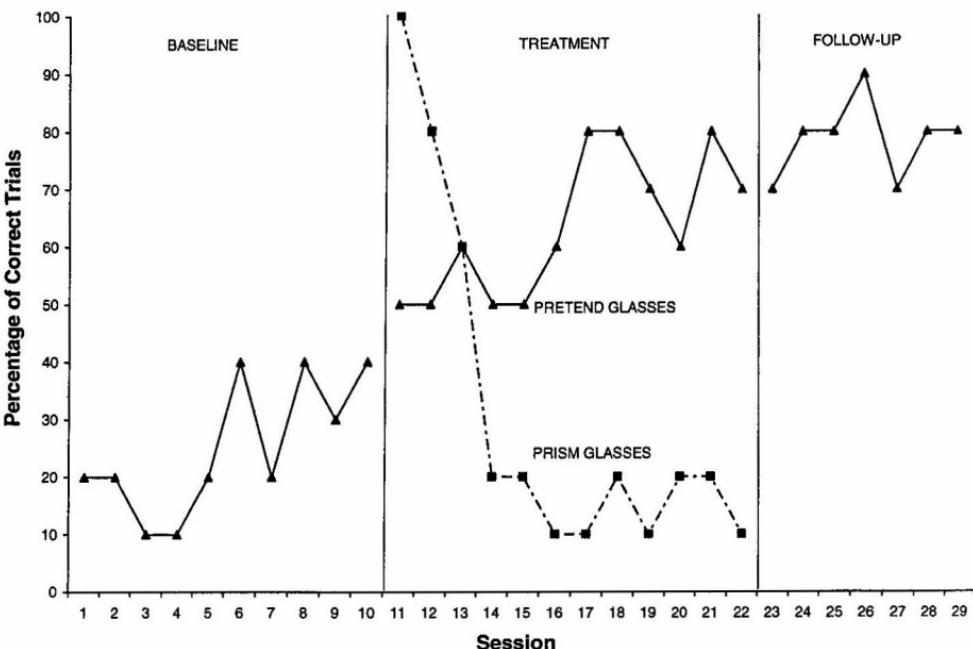
Open discussion on controversial treatments creates an opportunity for practitioners to present information on how to distinguish between scientific and pseudoscientific treatments, and to review what is known

and unknown from relevant research. Research supports clear recommendations against some treatments, notably FC, secretin, and nonvaccination. It also provides reasons to be skeptical about other treatments such as AIT. However, because of the large number of controversial treatments available, practitioners may not always be familiar with a particular treatment or have up-to-date knowledge of the research on that treatment. Under this circumstance, practitioners can express a willingness to learn about the treatment, review information that families bring, and describe criteria they would use to gauge whether the treatment appears promising.

Finally, practitioners can advocate for and, if resources are available, assist with an objective evaluation of a controversial treatment so that families can assess the treatment efficacy themselves. Guidelines for conducting this evaluation include the following (Hyman & Levy, 2000): First, make only one treatment change at a time and hold other treatments constant. Second, identify specific target behaviors to be addressed by the treatment, and use objective measures to obtain a baseline of this behavior prior to treatment. Finally, monitor ongoing changes in the target behavior with objective measures obtained by raters who are blind to the treatment (e.g., a teacher who is unaware of changes in vitamin consumption rate).

In some settings, such as schools, it is often possible to go a step further and conduct single-case experiments in which a child with ASD serves as his or her own control (Smith et al., 2005). The multielement design (also called alternating treatment design) may be especially useful because it yields quick results. The design involves implementing a treatment on alternate days or in alternate sessions. During the other days or sessions, a baseline is in effect (i.e., no intervention is provided) or another treatment is provided. Kay and Vyse (2005) used this approach to evaluate the effects of prism glasses on appropriate walking by an 8-year-old boy with ASD. Data are shown in Figure 9.4 and reveal that prism glasses interfered with appropriate walking, rather than helping. As a result, the intervention was discontinued.

A limitation of the alternating treatment design is that it is appropriate only when treatment effects are observable within a single day or session. Thus, if an intervention is said to require multiple days or weeks to change the target behavior, other designs must be considered. A useful example is the reversal design, in which a baseline phase is followed by a treatment phase, followed by a return to the baseline phase, and so on. Each phase lasts several sessions, days, or weeks. Figure 9.5 illustrates the use of a reversal design to evaluate the effects of an SIT intervention (brushing) for a 4-year-old boy with ASD who engaged in tantrums (screaming, crying, throwing objects, falling to the floor). During the baseline phases, Robert played with favorite toys or briefly watched vid-

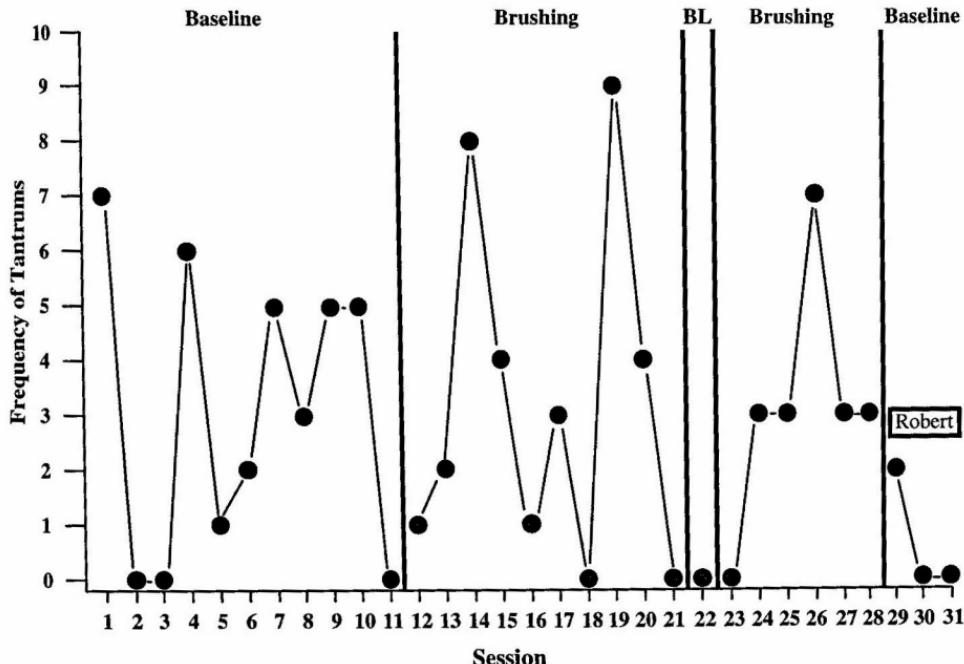


**FIGURE 9.4.** Alternating treatment design to evaluate the effect of prism lenses on appropriate walking by an 8-year-old boy with ASD. From Kay and Vyse (2005). Copyright 2005. Reprinted by permission of Lawrence Erlbaum Associates, Inc., a division of Taylor & Francis Group.

eos when he had breaks in learning activities. During treatment phases, Robert's mother performed the brushing at break times. Instructors, who were unaware of whether Robert was in the baseline or treatment condition, collected frequency data on tantrums during teaching sessions. Figure 9.5 shows that SIT failed to reduce this behavior (and possibly increased it). After the findings were discussed with the family, a decision was made to discontinue SIT.

## CONCLUDING COMMENTS

Beyond acknowledging the many reasons for the ubiquity of controversial treatments in ASD and considering how to confront them, an important next step is to increase support for developing treatments that scientists view as promising. Until the late 1990s, little funding was available for research on ASD. The funds that did become available were devoted



**FIGURE 9.5.** Reversal design to evaluate the effect of brushing on a 4-year-old boy with ASD. From Smith, Mruzek, and Mozingo (2005). Copyright 2005. Reprinted by permission of Lawrence Erlbaum Associates, Inc., a division of Taylor & Francis Group.

mainly to studies of the characteristics and causes of ASD, rather than to treatment. More recently, however, private foundations have begun to sponsor pilot studies on innovative treatments, and federal agencies have formed multisite networks to carry out large-scale clinical trials evaluating treatments that have shown promise in preliminary investigations (Vitiello & Wagner, 2004). These initiatives are encouraging. Although treatment studies often take years to complete, and although they are not infallible, they ultimately provide the firmest foundation for enabling families and practitioners to choose from an array of appropriate treatment options and for improving outcomes achieved by children with ASD.

#### ACKNOWLEDGMENTS

Preparation of this chapter was supported by Grant No. U54 MH066397 (Genotype and Phenotype of Autism).

## REFERENCES

- Alhage-Kientz, M. (1996). Sensory-based need in children with autism: Motivation for behavior and suggestions for intervention. *AOTA Developmental Disabilities Special Interest Section Newsletter, 19*(3), 1-3.
- American Psychological Association (1994). *Council policy manual: M. Scientific affairs*. Retrieved January 20, 2006, from [www.apa.org/about/division/cpm/scientific.html#6](http://www.apa.org/about/division/cpm/scientific.html#6).
- Ayres, A. J. (1972). *Sensory integration and learning disorders*. Los Angeles: Western Psychological Services.
- Ayres, A. J. (1979). *Sensory integration and the child*. Los Angeles: Western Psychological Services.
- Berard, G. (1993). *Hearing equals behavior*. New Canaan, CT: Keats.
- Bernard, S., Enayati, A., Redwood, L., Roger, H., & Binstock, T. (2000). Autism: a novel form of mercury poisoning. *Medical Hypotheses, 56*, 452-471.
- Bettelheim, B. (1967). *The empty fortress*. New York: Free Press.
- Biklen, D. (1993). *Communication unbound: How facilitated communication is challenging traditional views of ability/disability*. New York: Teachers College Press.
- Biklen, D., & Cardinal, D. N. (Eds.). (1997). *Contested words, contested science: Unraveling the facilitated communication controversy*. New York: Teachers College Press.
- Bouma, R., & Schweitzer, R. (1990). The impact of chronic childhood illness on family stress: A comparison between autism and cystic fibrosis. *Journal of Clinical Psychology, 46*, 722-730.
- Bundy, A. C., & Murray, E. A. (2002). Sensory integration: A. Jean Ayres' theory revisited. In A. C. Bundy, S. J. Lane, & E. A. Murray (Eds.), *Sensory integration: theory and practice* (2nd ed., pp. 3-34). Philadelphia: Davis.
- Case-Smith, J., & Bryan, T. (1999). The effects of occupational therapy with sensory integration emphasis on preschool-age children with autism. *American Journal of Occupational Therapy, 53*, 489-497.
- Committee on Children with Disabilities, American Academy of Pediatrics. (2001). The pediatrician's role in the diagnosis and management of autism spectrum disorder in children. *Pediatrics, 107*, 1221-1226.
- Coulter, H. L. (1990). *Vaccination, social violence, and criminality: The medical assault on the American brain*. Berkeley, CA: North Atlantic Books.
- Dawson, G., & Watling, R. (2000). Interventions to facilitate auditory, visual, and motor integration in autism: A review of the evidence. *Journal of Autism and Developmental Disorders, 30*, 415-421.
- Demicheli, V., Jefferson, T., Rivetti, A., & Price, D. (2005). Vaccines for measles, mumps and rubella in children. *Cochrane Database of Systematic Reviews, 4*, 1-36.
- Elder, J. H., Shankar, M., Shuster, J., Theriaque, D., Burns, S., & Sherrill, L. (2006). The gluten-free, casein-free diet in autism: Results of a preliminary double blind clinical trial. *Journal of Autism and Developmental Disorders, 36*, 413-420.
- Findling, R. L., Maxwell, K., Scotes-Wojtila, L., Huang, J., Yamashita, T., & Wiznitzer, M. (1997). High-dose pyridoxine and magnesium administration in children with autistic disorder: An absence of salutary effects in a double-

- blind, placebo-controlled study. *Journal of Autism and Developmental Disorders*, 27, 467-478.
- Finn, P., Bothe, A. K., & Bramlett, R. E. (2005). Science and pseudoscience in communication disorders: Criteria and applications. *American Journal of Speech-Language Pathology*, 14, 172-186.
- Fleck, F. (2003). UK and Italy have low MMR uptake. *British Medical Journal*, 327, 1124.
- Fombonne, E. (2003). Epidemiological surveys of autism and other pervasive developmental disorders: An update. *Journal of Autism and Developmental Disorders*, 34, 365-382.
- Green, C., & Shane, H. C. (1994). Science, reason, and facilitated communication. *Journal of the Association for Persons with Severe Handicaps*, 19, 151-172.
- Greenspan, S., & Wieder, S. (1997). Developmental patterns and outcomes in infants and children with disorders in relating and communicating: A chart review of 200 cases of children with autistic spectrum diagnoses. *Journal of Developmental and Learning Disorders*, 1, 87-141.
- Greenspan, S., & Wieder, S. (1999). A functional developmental approach to autism spectrum disorders. *Journal of the Association for Persons with Severe Handicaps*, 24, 147-161.
- Hart, B., & Risley, T. R. (1980). In vivo language intervention: Unanticipated general effects. *Journal of Applied Behavior Analysis*, 13, 407-432.
- Honda, H., Shimizu, Y., & Rutter, M. (2005). No effect of MMR withdrawal on the incidence of autism: A total population study. *Journal of Child Psychology and Psychiatry*, 46, 572-579.
- Hoppe, K., & Harris, S. L. (1990). Perceptions of child attachment and maternal gratification in mothers of children with autism and Down syndrome. *Journal of Clinical Child Psychology*, 19, 365-370.
- Horvath, K., Papadimitriou, J. C., Rabstyn, A., Drachenberg, C., & Tildon, J. T. (1999). Gastrointestinal abnormalities in children with autistic disorder. *Journal of Pediatrics*, 135, 559-563.
- Horvath, K., Stefanatos, G., Sokolski, K. N., Wachtel, R., 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.
- Hyman, S. L., & Levy, S. E. (2000). Autism spectrum disorders: When traditional medicine is not enough. *Contemporary Pediatrics*, 17(10), 101-116.
- Institute of Medicine. (2004). *Immunization safety review: Vaccines and autism*. Washington, DC: National Academies Press.
- Joint Commission Resources. (2000). A practical system for evidence grading. *Joint Commission Journal on Quality Improvement*, 26, 700-712.
- Kane, K. (2006, January 6). Death of 5-year-old boy linked to controversial chelation therapy. *Pittsburgh Post Gazette*. Retrieved January 30, 2006, from [www.post-gazette.com/pg/06006/633541.stm](http://www.post-gazette.com/pg/06006/633541.stm).
- Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child*, 2, 217-250.
- Kaplan, M., Edelson, S. M., & Seip, J. A. (1998). Behavioral changes in autistic individuals as a result of wearing ambient transitional prism lenses. *Child Psychiatry and Human Development*, 29, 65-76.

- Kaufman, B. N. (1976). *Son-Rise*. New York: Harper & Row.
- Kay, S., & Vyse, S. (2005). Helping parents separate the wheat from the chaff: Putting autism treatments to the test. In J. W. Jacobson & R. M. Foxx (Eds.), *Fads, dubious and improbable treatments for developmental disabilities* (pp. 265-277). Mahwah, NJ: Erlbaum.
- Kennedy, R. F. (2005, June 16). Deadly immunity. *Salon.com*. Retrieved December 15, 2005, from [www.salon.com/news/feature/2005/06/16/thimerosal/index\\_np.html](http://www.salon.com/news/feature/2005/06/16/thimerosal/index_np.html).
- Knivsberg, A-M., Reichelt, K. L., Hoiem, T., & Nodland, M. (2002). A randomised, controlled study of dietary intervention in autistic syndromes. *Nutritional Neuroscience*, 5, 251-261.
- Kuriyama, S., Kamiyama, M., Watanabe, M., Tamahashi, S., Muraguchi, I., Watanabe, T., et al. (2002). Pyridoxine treatment in a subgroup of children with pervasive developmental disorders. *Developmental Medicine and Child Neurology*, 44, 284-246.
- Lawler, C. P., Croen, L. A., Grether, J. K., & Van de Water, J. (2004). Identifying environmental contributions to autism: Provocative clues and false leads. *Mental Retardation and Developmental Disabilities Research Reviews*, 10, 292-302.
- Levy, S. E., & Hyman, S. L. (2003). Use of complementary and alternative treatments for children with autism spectrum disorders is increasing. *Pediatric Annals*, 32, 685-691.
- Levy, S. E., & Hyman, S. L. (2005). Novel treatments for autistic spectrum disorders. *Mental Retardation and Developmental Disabilities Research Reviews*, 11, 131-142.
- Levy, S. E., Mandell, D. S., Merhar, S., Ittenbach, R. F., & Pinto-Martin, J. A. (2003). Use of complementary and alternative medicine among children recently diagnosed with autistic spectrum disorder. *Journal of Developmental and Behavioral Pediatrics*, 24, 418-423.
- Linderman, T. M., & Stewart, K. B. (1998). Sensory-integrative based occupational therapy and functional outcomes in young children with pervasive developmental disorders: A single-subject design. *American Journal of Occupational Therapy*, 53, 207-213.
- Lord, C., Bristol-Power, M., Cafiero, J. M., Filipek, P. A., Gallagher, J. J., Harris, S. L., et al. (Eds.). (2002). *JADD special issue: NAS workshop papers*. *Journal of Autism and Developmental Disorders*, 32, 349-508.
- Lord, C., Rutter, M., DiLavore, P., & Risi, S. (2001). ADOS: Autism Diagnostic Observation Schedule. Los Angeles: Western Psychological Services.
- Lovaas, O. I., & Smith, T. (2003). Early and intensive behavioral intervention in autism. In A. E. Kazdin & J. Weisz (Eds.), *Evidence-based psychotherapies for children and youth* (pp. 325-340). New York: Guilford Press.
- Luyster, R., Richler, J., Risi, S., Hsu, W. L., Dawson, G., Bernier, R., et al. (2005). Early regression in social communication in autism spectrum disorders: A CPEA Study. *Developmental Neuropsychology*, 27, 311-336.
- McCracken, J. T., McGough, J., Shah, B., Cronin, P., Hong, D., Aman, M. G., et al. (2002). Risperidone in children with autism and serious behavior problems. *New England Journal of Medicine*, 347, 314-321.

- McGee, J. J., & Gonzales, L. (1990). Gentle teaching and the practice of human interdependence: A preliminary group study of 15 persons with severe behavior disorders and their caregivers. In A. C. Repp & N. N. Singh (Eds.), *Perspectives on the use of nonaversive and aversive interventions for people with developmental disabilities* (pp. 215-230). Sycamore, IL: Sycamore.
- Millward, C., Ferriter, M., Calver, S., & Connell-Jones, G. (2004). Gluten- and casein-free diets for autistic spectrum disorder. *Cochrane Database of Systematic Reviews*, 3, 1-14.
- Mostert, M. P. (2001). Facilitated communication since 1995: A review of published studies. *Journal of Autism and Developmental Disorders*, 31, 287-313.
- Mudford, O. C. (1995). Review of the gentle teaching data. *American Journal on Mental Retardation*, 99, 345-355.
- Mukhopadhyay, T. R. (2003). *The Mind Tree: A miraculous boy breaks the silence of autism*. New York: Arcade.
- Murch, S. H., Anthony, A., Casson, D. H., Malik, M., Berelowitz, M., Dhillon, A. P., et al. (2004). Retraction of an interpretation. *Lancet*, 363, 750.
- National Institutes of Health. (1998, October 16). *The use of secretin to treat autism*. Retrieved January 27, 2006, from [www.nichd.nih.gov/new/releases/secretin.cfm](http://www.nichd.nih.gov/new/releases/secretin.cfm).
- National Research Council. (2001). *Educating children with autism*. Washington, DC: National Academy Press.
- Newsom, C., & Hovanitz, C. A. (2005). The nature and value of empirically validated interventions. In J. W. Jacobson & R. M. Foxx (Eds.), *Fads, dubious and improbable treatments for developmental disabilities* (pp. 31-44). Mahwah, NJ: Erlbaum.
- Nye, C., & Brice, A. (2005). Combined vitamin B<sub>6</sub>-magnesium treatment in autism spectrum disorder. *Cochrane Database of Systematic Reviews*, 3, 1-17.
- Palfreman, J. (Director). (1993, October 19). Prisoners of silence. In J. Palfreman (Producer), *Frontline*. Washington, DC: Public Broadcasting Service.
- Pichichero, M. E., Cernichiari, E., Lopreiato, J., & Treanor, J. (2002). Mercury concentrations and metabolism in infants receiving vaccines containing thimerosal: A descriptive study. *Lancet*, 360, 1737-1741.
- Rawstron, J. A., Burley, C. D., & Eldeer, M. J. (2005). A systematic review of the applicability and efficacy of eye exercises. *Journal of Pediatric Ophthalmology and Strabismus*, 42, 82-88.
- Ray, T. C., King, L. K., & Grandin, T. (1988). The effectiveness of self-initiated vestibular stimulation in producing speech sounds in an autistic child. *Occupational Therapy Journal of Research*, 8, 186-190.
- Reichelt, K. L., Knivsberg, A. M., Nodland, M., & Lind, G. (1994). Nature and consequences of hyperpeptiduria and bovine casomorphins found in autistic syndromes. *Developmental Brain Dysfunction*, 7, 71-85.
- Reilly, C., Nelson, D. L., & Bundy, A. C. (1984). Sensorimotor versus fine motor activities in eliciting vocalization in autistic children. *Occupational Therapy Journal of Research*, 3, 199-212.
- Reiten, D. J. (1987). Nutrition and developmental disabilities: Issues in chronic care. In E. Schopler & G. B. Mesibov (Eds.), *Neurobiological issues in autism* (pp. 373-388). New York: Plenum Press.
- Research Units on Pediatric Psychopharmacology Autism Network. (2005). Ran-

- domized, controlled, crossover trial of methylphenidate in pervasive developmental disorders with hyperactivity. *Archives of General Psychiatry*, 62, 1266-1274.
- Rimland, B. (1964). *Infantile autism: The syndrome and its implication for a neural theory of behavior*. New York: Appleton-Century-Crofts.
- Rimland, B. (1987). Megavitamin B<sub>6</sub> and magnesium in the treatment of autistic children and adults. In E. Schopler & G. B. Mesibov (Eds.), *Neurobiological issues in autism* (pp. 390-405). New York: Plenum Press.
- Rimland, B. (1992). The FDA's war against health. *Autism Research Review International*, 6(2), 4.
- Rimland, B. (2000). The most air-tight study in psychiatry?: Vitamin B<sub>6</sub> in autism. *Autism Research Review International*, 14(3), 3.
- Rogers, S. J., & Ozonoff, S. (2005). What do we know about sensory dysfunction in autism?: A critical review of the empirical evidence. *Journal of Child Psychology and Psychiatry*, 46, 1255-1268.
- Rutter, M., LeCouteur, A., & Lord, C. (2003). *ADI-R: The Autism Diagnostic Interview-Revised*. Los Angeles: Western Psychological Services.
- Sandler, A. D., Sutton, K. A., DeWeese, J., Girardi, M. A., Sheppard, V., & Bodfish, J. W. (1999). Lack of benefit of a single dose of synthetic human secretin in the treatment of autism and pervasive developmental disorder. *New England Journal of Medicine*, 341, 1801-1806.
- Sandler, R. H., Finegold, S. M., Bolte, E. R., Buchanan, C. P., Maxwell, A. P., Vaisanen, M. L., et al. (2000). Short-term benefit from oral vancomycin treatment of regressive-onset autism. *Journal of Child Neurology*, 15, 429-435.
- Seroussi, K. (2000). *Unraveling the mystery of autism and pervasive developmental disorder: A mother's story of research and recovery*. New York: Simon & Schuster.
- Shattock, P., Kennedy, A., Rowell, F., & Berney, T. (1990). Role of neuropeptides in autism and their relationships with classical neurotransmitters. *Brain Dysfunction*, 3, 328-345.
- Sigman, M., & Mundy, P. (1989). Social attachments in autistic children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28, 74-81.
- Sinha, Y., Silove, N., Wheeler, D., & Williams, K. (2005). Auditory integration training and other sound therapies for autism spectrum disorders. *Cochrane Database of Systematic Reviews*, 3, 1-22.
- Smith, T. (1993). Autism. In T. Giles (Ed.), *Effective psychotherapies* (pp. 107-133). New York: Plenum Press.
- Smith, T., & Antolovich, M. (2000). Parental perceptions of supplemental interventions received by young children with autism in intensive behavior analytic treatment. *Behavioral Interventions*, 15, 83-97.
- Smith, T., Mruzek, D., & Mozingo, D. (2005). Sensory integrative therapy. In J. W. Jacobson & R. M. Foxx (Eds.), *Fads, dubious and improbable treatments for developmental disabilities* (pp. 331-350). Mahwah, NJ: Erlbaum.
- Smith, T., Scithill, L., Dawson, G., Guthrie, D., Lord, C., Odom, S., et al. (2007). Designing research studies on psychosocial interventions in autism. *Journal of Autism and Developmental Disorders*, 37, 354-366.
- Tinbergen, W., & Tinbergen, E. A. (1983). *Autistic children: New hope for a cure*. London: Allen and Unwin.

- Tolbert, L., Haigler, T., Waits, M. M., & Dennis, T. (1993). Brief report: Lack of response in an autistic population to a low dose clinical trial of pyridoxine plus magnesium. *Journal of Autism and Developmental Disabilities*, 23, 193-199.
- Vitiello, B., & Wagner, A. (2004). Government initiatives in autism clinical trials. *CNS Spectrums*, 9, 66-70.
- Wakefield, A. J., Murch, S. H., Anthony, A., Linnell, J., Casson, D. M., Malik, M., et al. (1998). Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children. *Lancet*, 351, 637-641.
- Watling, R., Deitz, J., Kanny, E. M., & McLaughlin, J. F. (1999). Current practice of occupational therapy for children with autism. *American Journal of Occupational Therapy*, 53, 489-497.
- Welch, M. G. (1987). Toward prevention of developmental disorders. *Pennsylvania Medicine*, 90, 47-52.
- Williams, K. M., & Marshall, T. (1992). Urinary protein patterns in autism as revealed by high resolution two-dimensional electrophoresis. *Biochemical Society Transactions*, 20, 189S.
- Williams, K. W., Wray, J. J., & Wheeler, D. M. (2005). Intravenous secretin for autism spectrum disorder. *Cochrane Database of Systematic Reviews*, 4, 1-35.
- Witwer, A., & Lecavelier, L. (2005). Treatment incidence and patterns in children and adolescents with autism spectrum disorders. *Journal of Child and Adolescent Psychopharmacology*, 15, 671-681.