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The TEACCH Program in the Era of Evidence-Based Practice

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Abstract 'Evidence-based practice' as initially defined in medicine and adult psychotherapy had limited applicability to autism interventions, but recent elaborations of the concept by the American Psychological Association (Am Psychol 61: 271–285, 2006) and Kazdin (Am Psychol 63(1):146–159, 2008) have increased its relevance to our field. This article discusses the TEACCH program (of which the first author is director) as an example of an evidence-based practice in light of recent formulations of that concept.

Keywords TEACCH · Evidence-based

Brief History of Evidence-Based Practice

The concept of evidence-based interventions began in the field of medicine in the 1970's and in recent years has been employed in many other disciplines. In psychology, the concept was initially called "empirically validated treatment" (EVT) and later "empirically supported treatment" (EST) and it arose as a means of documenting the benefits of adult psychotherapy in the context of pressures from psychiatric medication and from managed care (Society of Clinical Psychology 1995). The evidence-based concept has been adapted by various professional groups to examine different forms of intervention for a variety of clinical populations, including treatment and education for children with autism (e.g., Rogers 1998; Rogers and Vismara 2008).

The initial definitions for EST in psychology were quite rigid (e.g., requiring evidence from at least two group studies using randomized controlled trials or nine single-case studies, using a treatment manual, and employing a research design that demonstrated that the intervention being studied was better than another treatment [not just 'no treatment' or a 'waiting list control group']). These criteria, designed to evaluate adult psychotherapy, were not a particularly good fit for evaluating autism interventions because of the relatively limited research base and the extremely heterogeneous population of people with autism, among other factors (Mesibov and Shea 2009) (The term autism will be used from this point forward to mean all autism spectrum disorders.).

Actually, many psychologists chafed under the early EST criteria, leading the American Psychological Association (APA) in 2006 to develop a new, broader concept: Evidence-Based Practice in Psychology (EBPP), defined as "the integration of the best available research *and clinical expertise within the context of patient characteristics, culture, values, and preferences'* (emphasis added; APA 2006, p. 273). More recently, Alan Kazdin, the 2008 APA President, expanded on the concepts in the APA (2006) definition in an important article "Evidence-Based Treatment and Practice: New Opportunities to Bridge Clinical Research and Practice, Enhance the Knowledge Base, and Improve Patient Care" (Kazdin 2008).

The early EST movement asked 'Does X treatment work better than Y treatment for Z disorder?' In contrast, APA (2006) and Kazdin (2008) essentially suggested restating the thrust of EBPP as 'What do we know that we can apply to this situation to allow us to achieve the best outcome for client C?' We find the latter question to be much more

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productive because it encourages the use of diverse sources of information for developing and evaluating interventions.

For the purpose of this discussion, we propose the following core principles of EBPP, derived and modified from the APA (2006) definition and Kazdin's (2008) paper.

1. Evidence-based practice should have a "cogent rationale for clinical strategies" (APA 2006, p. 284).
2. Research findings and clinical expertise are both important for establishing an evidence base. The research base should include randomized controlled trials, but can and should take other forms as well. Clinical expertise can be reflected in experience and professional reputation.
3. Interventions should be individualized according to clients' unique characteristics.
4. Intervention research should include real-life outcome measures, even results that seem "loose and fuzzy … or that are moving targets" (Kazdin 2008, p. 148).
5. Truly effective treatments are those that are generalizable to complex real-life conditions and multiple cultures and settings.

As one example of how this formulation of EBPP can look when applied to interventions for people with autism, in this paper we discuss evidence-based elements of the TEACCH approach (of which the first author is director).

The TEACCH Program

Overview

TEACCH (Treatment and Education of Autistic and related Communication-handicapped CHildren) is a clinical service and professional training program, based at the University of North Carolina at Chapel Hill, that has incorporated and contributed to the evidence base of autism interventions. The program was started in 1972 by the late Eric Schopler, Ph.D. and now includes nine regional centers in North Carolina that provide clinical services to people with autism of all ages. The center directors are all faculty members at the University of North Carolina at Chapel Hill and engage in a variety of university-related activities, including training, research, and consultation with other service providers.

Theoretical Rationale for the TEACCH Approach

The TEACCH approach is called "Structured Teaching." Structured Teaching is based on evidence and observation that individuals with autism share a pattern of neuropsychological deficits and strengths that we call the 'Culture of Autism' (Mesibov et al. 2005), which includes the following characteristics:

1. Relative strength in and preference for processing *visual* information (compared to difficulties with auditory processing, particularly of language).
2. Heightened attention to *details* but difficulty with sequencing, integrating, connecting, or deriving meaning from them
3. Enormous variability in *attention* (individuals can be very distractible at times, and at other times intensely focused, with difficulties shifting attention efficiently).
4. *Communication* problems, which vary by developmental level, but always include impairments in the initiation and social use of language (pragmatics).
5. Difficulty with concepts of *time* including moving through activities too quickly or too slowly and having problems recognizing the beginning or end of an activity, how long the activity will last, and when it will be finished.
6. Tendency to become *attached to routines* and the settings where they are established, so that activities may be difficult to transfer or generalize from the original learning situation, and disruptions in routines can be uncomfortable, confusing, or upsetting.
7. Very intense *interests and impulses* to engage in favored activities and difficulties disengaging once engaged.
8. Marked *sensory* preferences and aversions.

Evidence for this concept of the Culture of Autism is woven throughout the research literature. For summaries and reviews, the following sources are recommended: Dawson (1996), Ozonoff et al. (2005), and Tsatsanis (2005).

Evidence-Base: Research Findings

In discussing the research literature, we begin by noting our belief that the contemporary emphasis on randomized controlled trials (RCT) unduly limits the study of autism interventions (and other psychological interventions). This issue is addressed at greater length in a separate paper, "Evidence-Based Practices and Autism" (Mesibov and Shea 2009). The limitations of traditional approaches to clinical research are also discussed by Kazdin (2008), who proposes broadening (not replacing) the RCT approach by shifting priorities to include studies of (a) mechanisms of change, (b) moderators of change and their application to clinical practice, and (c) qualitative research. Along the same lines, Koenig et al. (2009), describing the complexities of evaluating group-delivered social skills interventions for school-age children with pervasive developmental

disorders, wrote that "the existing paradigm for evaluating the evidence base of intervention may need modification to permit a more intricate analysis of the extant research, and increase the sophistication of future research" (p. 1163). Nevertheless, there is broad agreement in the field that standard research strategies play an important role in studying specific techniques and mechanisms used to affect specific behaviors or skills.

Research on Components

One approach to demonstrating the effectiveness of a comprehensive program like TEACCH is empirical support for its components and mechanisms (American Speech-Language-Hearing Association 2006; Bohart et al. 1998; Chorpita 2003; Henry 1998; Iovannone et al. 2003). Such research need not be conducted within one treatment or research program; in fact, a series of findings from a number of researchers on varied and individualized application of a general principle provides an even firmer foundation for acceptance of the underlying principle (e.g., the effectiveness of visual schedules for making future events predictable and comprehensible).

Structured Teaching postulates four essential mechanisms, some of which have empirical support, although more refined research is needed because the individual contributions of these mechanisms and their sub-components have not been studied. The essential mechanisms of Structured Teaching are (a) structuring the environment and activities in ways that are understandable to the individual; (b) using individuals' relative strengths in visual skills and interest in visual details to supplement relatively weaker skills; (c) using individuals' special interests to engage them in learning; and (d) supporting self-initiated use of meaningful communication.

Structure

The term 'structure' in autism interventions generally describes organization of time, space, and sequences of events within the environment in order to make learning activities clearer and easier to perform.

Rutter and Bartak (1973) provided an early demonstration of the effectiveness of structure. They compared the skills and behavior of 50 children, aged 7 – 9 years at the beginning of the study, who were attending three different educational programs with different philosophies: (a) autism-specific 'regressive'/psychotherapeutic, (b) cross-categorical combined psychotherapeutic and special education, or (c) autism-specific structured special education. After 3 ½ - 4 years, the children in the structured program demonstrated significantly more on-task behavior

and higher academic achievement than the children in the other settings, although there were no differences among the programs in behaviors, speech, or social responsiveness generalized to the home environment, according to parents.

Recent literature reviews indicating empirical support for the effectiveness of structure in autism include Rogers' (1999) summary of intervention research with young children; the review of research using single-subject designs by Odom et al. (2003), and a thoughtful analysis of the current status of autism treatment by Bodfish (2004), who concluded that there is clear empirical support for the benefits of structure and predictability in the environment. Structured work systems are also considered to have a "confirmed evidence base" by the National Professional Development Center on Autism Spectrum Disorders at the University of North Carolina at Chapel Hill (http://www.fpg.unc.edu/~autismPDC/assets/pdf/ebp_flyer_1-23-09.pdf). Further, the American Academy of Child and Adolescent Psychiatry's (1999) *Practice Parameters for the Assessment and Treatment of Children, Adolescents, and Adults with Autism and Other Pervasive Developmental Disorders* include structure as an important element of educational interventions, and the National Research Council's comprehensive and influential publication *Educating Children with Autism* (2001) recommended "repeated, planned teaching opportunities" (p. 219) consistent with our definition of structure.

TEACCH generally recommends four kinds of structure. The first is *physical* structure; examples are (a) using elements such as furniture arrangement or visual cues that show a student/client which activities occur in specific areas and where to stand or sit in the area, and (b) reducing environmental sources of distraction or overstimulation by seating a student facing away from a door or window. The second type of structure involves organizing and communicating the *sequence of events* of the day by making this organization (i.e. a schedule) understandable and meaningful to the student/client. The most basic type of 'schedule' uses objects to help the student make the transition to the next activity (e.g., actual facecloth to be used in the bath; actual spoon to be used for the snack). For more developmentally advanced students, pictures or written words are used for schedules, and those schedules are of increased length (e.g., part-day, full-day, weekly agenda). The third kind of structure is the organization of individual *tasks* using visual means to show the student/client the following information: (a) What he is supposed to do, (b) How long the activity will last or how many repetitions he will do, (c) How he can see that he is making progress toward being finished, (d) How he can see that the activity is finished, (e) What he will do next.

The fourth kind of structure is linking individual tasks into a sequence of activities, called the *work/activity*

system, in order to increase the amount of time that the individual is meaningfully engaged in productive activities. An elegant recent demonstration of the effectiveness of work/activity systems (incorporating other elements of structure as well) is found in the study by Hume and Odom (2007). This study, using an ABAB single subject design with 3 individuals with autism (ages 6, 7, and 20 years) documented marked increases, compared to baseline rates, of on-task behavior and marked reduction of teacher prompting when structured individual work/activity systems based on TEACCH principles were implemented. Similarly, Hume (2009) documented increased on-task behavior and accuracy, decreased adult prompting and task completion duration, and generalization to other conditions when work/activity systems were studied with 3 seven-year-old children using a multiple-probe-across-participants design.

Visual Information

That many aspects of the visual skills of individuals with autism are preserved or even superior relative to age peers has long been established (e.g., Caron et al. 2004, Dawson 1996; Hermelin and Frith 1971; Hermelin and O'Connor 1970; Kamio and Toichi 2000; Minshew et al. 1997; O'Riordan et al. 2001; Tubbs 1966). With this foundation, numerous researchers and clinicians have accepted the importance of visual material for increasing the skills of individuals with autism (American Speech-Language-Hearing Association 2006; Mesibov et al. 2002; National Research Council 2001; Stromer et al. 2006; Quill 1997).

Boucher and Lewis (1989) showed that children with autism given written directions made significantly fewer errors than children given similar directions verbally or through a demonstration. Krantz, McClannahan, and MacDuff, in a series of studies using photographic or written material, taught youngsters to initiate social exchanges, (Krantz and McClannahan 1998) and to follow schedules of planned activities (Krantz, et al. 1993; Mac-Duff et al. 1993). Similarly, Pierce and Schreibman (1994) taught youngsters with autism to carry out daily living skills without supervision using picture cues. Bryan and Gast (2000) reported significantly more time on tasks and more correct completion of assigned tasks when visual activity schedules were used. Similar results in terms of increased task engagement as well as reduction of challenging behaviors were reported by Massey and Wheeler (2000). Several studies have also demonstrated the effectiveness of picture cues to reduce a child's disruptive or aggressive behavior during transitions between activities (Dettmer et al. 2000; Dooley et al. 2001; Schmit et al. 2000). Other investigators have demonstrated the effectiveness of written and/or picture cues for increasing social

interaction skills (Sarokoff et al. 2001; Thiemann and Goldstein 2001) and play skills (Morrison et al. 2005).

Structured Teaching relies strongly on using visual information to promote engagement in productive activities and to reduce the confusion and distress that can be caused when too much language processing is required. Visual information is a key element of physical structure, schedules, instructions for activities, communication, and reminders about expectations and limits. Visual information is conveyed in various ways depending on the developmental skills of the individual, ranging from concrete objects for learners at very early developmental levels to written "to do" lists and reminders for adolescents and adults with average or superior intelligence (see Mesibov et al. 2005 for a detailed description of the use of visual supports).

Special Interests

Intense and atypical interests are a defining feature of autism spectrum disorders (American Psychiatric Association 2000) and many researchers have found that using these interests to engage individuals in learning is effective. Hung (1978), Wolery (as cited in Wolery et al. 1985), Wolery et al., (1985), and Sugai and White (1986) demonstrated that stereotyped self-stimulatory behaviors could function as reinforcers for cognitive, language, and vocational tasks. Further, Charlop et al. (1990) found that the opportunity to engage in stereotyped motor movements or repetitive speech was a markedly more effective reinforcer than food for increasing correct performance on cognitive tasks. Charlop-Christy and Haymes (1996, 1998) also showed that they could reduce stereotyped motor movements, aggression, and tantrums by using access to preferred play objects as reinforcers for periods of time in which the target behaviors did not occur. Koegel and Koegel (1995, 2006) and colleagues, as well as others, have shown that language interventions that use the child's or adult's interests are more effective than discrete trial training using arbitrarily-chosen stimuli (Delprato 2001). Baker et al. (1998) and Baker (2000) incorporated children's special interests into social games such as Bingo, tag, and follow the leader, and reported marked increases in social interaction. Similarly, Boyd et al. (2007) found that incorporating children's special interests into play materials increased social initiations on the part of the youngsters with autism.

Like many other approaches, Structured Teaching programs use clients' special interests to reward successful completion of tasks. Structured Teaching also incorporates individuals' special interests into other aspects of learning—for example, it is not unusual to see Thomas the Tank pictures for teaching mathematical concepts or turn-taking,

for marking a student's seat or cubby, or for drawing a student's attention to his daily schedule.

Meaningful, Self-Initiated Communication

Learning to communicate is a major issue for many individuals with autism (not for those with Asperger syndrome). For individuals who are at a preverbal or low-verbal level, one modern approach is based on the premise that "the development of preverbal communication is a necessary precursor to the development of the intentional use of language to communicate. Words should be mapped onto preverbal communication skills" (Wetherby et al. 1997, p. 515). This is sometimes called the social-pragmatic developmental approach, which is on the opposite end of a continuum of communication interventions from the massed discrete-trial approach (Prizant and Wetherby 1998). In other words, learning meaningful language is not equivalent to simply learning to say words during drills. Delprato (2001) reviewed 8 studies contrasting discrete-trial approaches to what he called 'normalized' approaches (equivalent to the social-pragmatic developmental approach) and concluded that all those studies favored the 'normalized' approach.

Consistent with the social-pragmatic developmental approach, Structured Teaching considers that receptive understanding is the foundation for expressive use of communication. Our approach to teaching early communication skills initially takes the form of associating labels (typically either objects or visual symbols of some kind, paired with spoken words) with meaningful, highly interesting activities in the individual's schedule. As the individual learns the association between the symbols/labels and the activities, it is then possible to begin offering choices, which is the first step toward understandable, socially acceptable expressive communication. Making the availability of choices visually clear helps to move the individual toward initiating choices rather than becoming dependent on prompting. Eventually, more social, academic, and vocational uses of language can be taught and stimulated according to the individual's cognitive skills. (See Mesibov et al. 2005 for a more detailed description of the TEACCH approach to communication).

Direct Research Support for the Overall TEACCH Program

Another empirical foundation for a treatment program is direct research support for the program. Standards for research methodology have changed over the years, and it must be acknowledged that some early TEACCH studies would not meet current criteria for elements such as control groups, blind raters, or statistical analysis. Some studies

focused on parent training in the TEACCH strategies, rather than on the strategies themselves. Further, TEACCH strategies have been refined over time, so that early studies do not provide direct evidence for current methods.

An early TEACCH intervention study was an investigation by Schopler et al. (1971) of the benefits of structure. The study group consisted of 5 children with autism, ranging in age from 4 to 8 years. Schopler described the study as

"rotating a group of children with autism from structured to unstructured sessions over two repeated two-week cycles … In the structured session, the adult decided on the materials to be used, the length of time, and how to use them. In the unstructured session, the child selected the material, how long, and in what manner to work with it…. We found that the children responded better to structured than unstructured conditions, and that children with lower developmental functions became more disorganized the less structure they had" (Mesibov et al. 2005, p. 3).

Specifically, in the structured sessions children were rated as demonstrating increased relatedness, more appropriate affect, more meaningful engagement with activities, and less repetitive, self-stimulatory behavior. A limitation of this study was that raters were TEACCH program staff; also, there was no control group.

Marcus et al. (1978), analyzed pre- and post-treatment videotapes of mother–child interactions in 10 families (children were ages 2 ½ - 5 years). Treatment consisted of 6-8 hours of training parents in TEACCH techniques. Each mother was then rated on seven dimensions and an overall impression while she taught her child an unfamiliar, standardized task. The dimensions of the rating scale, which was designed for this study, were organization of materials and space, pacing, language, teaching techniques, behavior control, change and adaptation in response to the child's behavior, and atmosphere of enjoyment and engagement. Marked improvement of the mothers' teaching skills and on the children's cooperation and engagement in tasks were reported. However, raters were not reported to be blind to the goals of the study or the participants' treatment status, and there was no control group.

In 1982, Schopler et al. published a study of program effectiveness based on questionnaires returned by 348 families who had received services at TEACCH between 1966 and 1977. Parents' ratings reflected high overall satisfaction with TEACCH and markedly improved child behaviors. Like all studies involving mailed questionnaires, there were issues of families who did not return the forms, perhaps skewing the study toward the most satisfied families, although a sample of non-responders who were

eventually tracked down rated the helpfulness of TEACCH very highly (Schopler et al. 1982).

Short (1984) used behavioral observations of 15 children and their parents, in addition to a semi-structured interview and two rating scales, to assess changes during TEACCH treatment compared with changes during a waiting period prior to treatment. Behavioral observations indicated significant improvement in the amount of child communication and appropriate engagement with materials, and in parental involvement with and guidance of their children's behavior. Nonsignificant trends toward decreased inappropriate behavior and decreased parental stress were reported. Parents rated the effectiveness of treatment very positively.

A study by Bristol et al. (1993) compared self-reported symptoms of depression in two groups of mothers of preschool children with autism or severe communication handicaps. One group ($N = 14$) participated in the TEACCH program and the control group ($N = 14$) did not. The mothers who received TEACCH intervention reported significantly fewer depressive symptoms between baseline and 18 months than did the control group. The groups were not randomly assigned: some mothers chose to pursue TEACCH services while others did not. The latter group of mothers lived significantly farther away from TEACCH centers than did the treated group, which led the authors to speculate that distance was the primary baseline factor that differentiated the groups. Depressive symptoms were equivalent between the two groups at the beginning of the study.

Ozonoff and Cathcart (1998) compared pre- and post-treatment developmental skills of a group of 11 preschool-age children with autism with the skills of a matched control group (not randomly assigned—the first eleven appropriate referrals received treatment, the subsequent eleven constituted the control group). Treatment consisted of 8 – 12 sessions of an individualized TEACCH-based home program taught to parents by trained graduate students. All children also attended school or other day treatment programs. The group receiving TEACCH treatment improved significantly more than the control group overall on the Psychoeducational Profile—Revised (PEP-R; Schopler et al. 1990) and on the imitation, fine motor, gross motor, and cognitive-performance subscales and showed marked progress on the perception and cognitive-verbal subscales as well. In addition to the issue of non-random assignment, the other potential limitations of this study were that different testers evaluated the treated and control groups, and these testers were not blind to group assignment.

Panerai et al. (2002) compared the developmental skills of a group of 8 children and adolescents with autism and severe mental retardation who received TEACCH-based interventions in an Italian residential program with the skills of a matched group of children who lived at home and attended regular Italian public school classrooms with a support teacher (the standard Italian special education model). After one year, the group in the TEACCH-based program had made significantly more progress on the PEP-R than the control group had made. Extending this line of research, Panerai et al. (2009) compared PEP-R and Vineland Adaptive Behavior Scales scores of three groups of school-aged youngsters with autism and severe mental retardation. As in the earlier study, one group received TEACCH-based interventions in the residential program, one group received the standard Italian special education; in addition, a third group attended regular public school but their support teachers and parents were trained in the TEACCH approach. Results indicated significantly better developmental progress and fewer maladaptive behaviors in both groups in which TEACCH techniques were used. (These Italian studies must be considered quasi-experimental because of various methodological limitations.)

Van Bourgondien et al. (2003) looked at the skills, negative behaviors, and satisfaction of the families of 6 adults with autism 18 months after the clients entered a residential program based on the TEACCH model, compared to those factors for 26 similar adults who had also applied for the TEACCH program. Admission was based on a "part-random, part clinical assignment procedure" (p. 132.). Those not admitted continued to live either in family homes, group homes, or institutions. Eighteen months after admission, serious negative behaviors were significantly lower for the TEACCH program group than the others, and the families of those in the TEACCH program were significantly more satisfied than those in group homes. However, skill levels in these groups of severely disabled individuals did not change significantly during the 18 months of the study.

Welterlin's (2009) dissertation, using random assignment to treatment or wait list control conditions, evaluated the effectiveness of a 12-session intervention that taught TEACCH methods to parents of 10 two- and three-year old children with autism,. Treatment resulted in significant increases in fine motor skills, decreased maladaptive behavior, increased independence, measurable increases in visual receptive skills, improved parental teaching skills, and marked decreases in parental distress.

There is clearly a need for additional research into both individual components of the TEACCH approach and overall program effectiveness. Postulated mechanisms of change (i.e. structure, visual supports, the use of special interests, and the association of visual symbols with meaningful activities as a foundation for receptive and expressive language) could be examined at various ages and developmental levels. Overall evaluation of

comprehensive programs is significantly more difficult to achieve, in terms of research support, design, and meaningful, long-term outcomes. An important effort in this direction is the ongoing comparison of the TEACCH and LEAP (Learning Experiences: An Alternative Program for Preschoolers and Parents) programs for young children (Odom 2007).

Evidence-Base: Clinical Expertise

In the 35+ years since its inception, TEACCH has served over 9,500 clients and families of people with autism. Indicators of professional recognition include APA's Gold Medal award to the TEACCH program in 1972, the 1997 APA Award for Distinguished Professional Contributions in Public Service to TEACCH director Gary Mesibov, and the (posthumous) 2006 American Psychological Foundation Gold Medal Award for Life Achievement in the Application of Psychology to Eric Schopler. Also, clinical psychology internships at TEACCH were a formative part of the training of many of the clinical researchers who are now expanding the evidence base in the field (e.g., Cathy Lord, Sally Ozonoff, and Wendy Stone).

Evidence-Base: Individualization

Because people with autism differ dramatically from each other on a large number of variables (e.g., age, intelligence, language skills, social skills and interests, rigidity, organizational skills, special interests), it is important to incorporate assessment of these and other factors into individualized interventions. This approach is different from programs that use a more tightly manualized methodology. In order to provide information about individual profiles for programming purposes, TEACCH developed two assessment instruments: the Psychoeducational Profile (now in its third revision; Schopler et al. 2005) for young children and the TEACCH Transition Assessment Profile (T-TAP; Mesibov et al. 2007) for adolescents and adults. These instruments provide a starting point for individualized plans for teaching and supporting emerging skills. Structured Teaching strategies can be individualized because they are based on broad principles of the Culture of Autism rather than a specific curriculum, manual, or set of intervention techniques. Interventions using Structured Teaching can be designed both for "concrete" learners who function, communicate, and learn best through the use of objects, pictures, and other tangible methods, and for "abstract" learners who find spoken and written language and other symbolic content meaningful.

Evidence-Base: Real-Life Measures

In the field of autism, outcome measures of services to adults are limited and have focused almost exclusively on supported employment and related community living skills (e.g., the work of Patricia Howlin and colleagues; [Howlin 1997; Mawhood and Howlin 1999]; the work of Marcia Datlow Smith and colleagues [Wehman et al. 2009]). A report about 96 clients who received TEACCH supported employment services (Keel et al. 1997) documented good hourly wages and job retention data compared to the clients' status at referral. (There was no control group).

The field does not yet have good tests and norms with which to measure a wider variety of outcome variables for of adults with autism. Further, as Kazdin (2008) pointed out about standardized measures in psychotherapy research with developmentally typical adults, even "a statistically significant change on standard, popular, valid, and useful measures may not tell us how a patient is doing in the world" (p. 148).

Studies by TEACCH faculty and students have begun to diversify the descriptive literature about adults with autism by looking at topics such as enjoyment of humor (Van Bourgondien and Mesibov 1987), sexual behavior and interests (Ousley and Mesibov 1991; Van Bourgondien et al. 1997), perceptions of popularity (Mesibov and Stephens 1990) and feelings of loneliness and other social challenges (Merkler 2007; Sperry and Mesibov 2005). These studies represent a very preliminary step toward increasing our knowledge about the psychological experiences of adults with autism, which is a prelude to studying the effects of intervention on these experiences.

Evidence-Base: Generalizability

The difference between the results of interventions in controlled laboratory settings and real-life clinical practice has long been recognized. These results are generally referred to as efficacy and effectiveness, respectively; effectiveness is typically lower than efficacy. The gap between experimental research and real-world practice is at least as wide in autism intervention as it is in other fields of psychology, given the variety of settings where autism interventions are used, the variety of practitioners, and the heterogeneity of clients, most obviously in age and developmental level.

Most autism intervention takes place in homes or local public schools, although TEACCH strategies have also been adapted for early intervention programs; residential programs; social groups, summer camps, and other recreation programs; individual and group counseling sessions; medical, dental, and therapy appointments; and competitive and sheltered employment sites. We certainly have had the

experience of seeing imprecise understanding and application of our concepts and techniques among those who attempt to use them. And yet the clinical robustness of Structured Teaching even in imperfect conditions has been striking. Structured Teaching principles and strategies are in use internationally in classrooms, day programs, and residential programs. TEACCH faculty have been invited to teach or consult in more than 20 countries in Europe, South America, Africa, and the Middle East, and Structured Teaching strategies have been successfully implemented in both big cities (e.g., London, Tokyo, Hong Kong) and rural areas of India, Pakistan, Brazil, and other countries (cf. Schopler 2000).

Concluding Comments

An approach to the concept of 'evidence-based' using a checklist of design factors and statistical analysis of results is appealing and important (see Reichow et al. 2008 for an excellent autism-specific approach), whereas considering evidence from a variety of sources is cumbersome at best, and potentially problematic when different forms of evidence conflict (Mesibov and Shea 2009). However, what is neat is not always what is most clinically useful. Moving away from who wins the "horse race" among competing interventions (Lampropoulos 2000) to the question of 'what do we know that may best help this client?' is a critical shift. The importance of research is indisputable, but we concur with the broader APA (2006) definition of evidence-based practice in psychology that also incorporates the elements of clinical expertise and flexibility based on cultural variables and clients' unique circumstances. Although EBPP began in the context of psychotherapy for adults, our thesis is that its core principles are relevant to the field of psychoeducational/ behavioral interventions for autism as well, and that TEACCH is an example of a program that both reflects and contributes to the evidence base of autism interventions.

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