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Early and intensive behavioral intervention for autism: A survey of clinical practices

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ABSTRACT

Early and intensive behavioral intervention (EIBI) has been demonstrated to be a highly effective treatment for early childhood autism. As EIBI programs have proliferated, they have also begun to mutate and evolve such that between-program differences in specific practices are quite common. Unfortunately, the extent of this procedural variability is unknown. The purpose of the present investigation was to begin documenting the specific practices of EIBI programs. A 43-question Internet survey was distributed to professional supervisors of EIBI programs who provided information regarding their program's characteristics and practices. A total of 211 program supervisors provided information on a number of practices, including curriculum, program size, therapist expertise and training, supervision, data collection, trial interspersal, consequence delivery, prompt fading, skill maintenance, and problem behavior assessment and treatment. The results indicate considerable variation in a number of EIBI practices. The implications of these findings are discussed.

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Multiple outcome studies have demonstrated that early and intensive behavioral intervention (EIBI) is a highly effective form of treatment for early childhood autism (Eikeseth, *in press*). This treatment approach has three unique characteristics. First, EIBI is delivered intensively, which often involves one-to-one instruction for up to 40 h per week over several years. Second, treatment procedures are based on the principles of operant conditioning (e.g., reinforcement, stimulus control, generalization). Third, EIBI

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employs a skill-based curriculum that is hierarchically organized and developmentally sequenced. In recent years, EIBI has been widely disseminated within the service-delivery arena. For example, in a recent Internet survey of 552 parents, 36.4% of them reported currently using applied behavior analysis¹ with their children and 22.7% reported using it in the past (Green et al., 2006).

A number of procedural variations have developed during the widespread dissemination of EIBI. Many early EIBI programs were based on the UCLA model, which was the first to receive extensive research attention (e.g., Lovaas, 1987; McEachin, Smith, & Lovaas, 1993). However, as time passed and more clinicians became involved in the EIBI enterprise, various practices began to change. These variations include differences in language curriculum (e.g., psycholinguistic vs. Skinnerian; Sundberg & Michael, 2001), treatment format (discrete trial teaching vs. naturalistic language approaches; Delprato, 2001), and program supervision (e.g., psychologists vs. parents; Bibby, Eikeseth, Martin, Mudford, & Reeves, 2002).

A number of factors most likely influenced the emergence of procedural variations within EIBI. First, EIBI is an enormous enterprise that often involves thousands of hours of treatment, dozens of curricular programs, and hundreds of skills taught to children. Such an expansive treatment would easily be expected to mutate and evolve over time. Second, curricular manuals that recommend different practices have been published (e.g., Lovaas, 2003; Sundberg & Partington, 1998). Clinicians who use these manuals would be expected to advance their practices. Third, the Internet and private workshops have permitted rapid and relatively low-effort dissemination by a variety of professionals advocating different practices. Fourth, the demand for qualified behavior analysts to supervise EIBI programs appears to exceed their supply. Thus, individuals without proper training are most likely involved in the EIBI service delivery and likely introduce their own procedural modifications.

The purpose of the present study was to begin documenting the specific practices of EIBI programs. Such documentation is important because not every variation of EIBI has been shown to be effective. For example, Bibby et al. (2002) retrospectively summarized archival data from a parent-implemented EIBI effort in the United Kingdom and found that long-term outcomes were relatively poor compared to earlier studies that involved professionals and more frequent supervision. Thus, it is important to identify commonly occurring practices to determine their correspondence with the evidentiary base.

1. Method

1.1. Participants

Participants were recruited by e-mailing invitations to participate to approximately 450 administrative and clinical contacts at programs that serve children with autism, and approximately 120 listservs (e.g., verbal behavior [VB], behavior analysis [BEHAV-AN]), and Yahoo groups (e.g., DTT-NET, VB, ABA job connections, ABA parents) devoted to the topics of autism or applied behavior analysis. Two hundred and eleven responses were received to an online survey supported by Hosted Survey (www.hostedsurvey.com).

1.2. Materials

Participants were provided with a link to access the survey in either the recruitment email or online posting. The link was active from March 23, 2006 through August 24, 2006. The survey included 43 multiple-choice and fill-in-the-blank questions that addressed (1) the program (e.g., type of treatment provided, curriculum used, location of treatment, number and age of children served); (2) therapists (e.g., training and evaluations, educational background, certification, caseloads); (3) supervisors (e.g., educational background, certification, caseloads, observations, team meetings); (4) parents (e.g., level of involvement, training); (5) treatment (e.g., duration, structure, reinforcement, acquisition procedures, maintenance and generalization, data collection, addressing problem behavior); and (6) research (e.g.,

¹ Although the term *applied behavior analysis* is often used to describe this treatment approach, we prefer *early and intensive behavioral intervention* because (a) it more clearly describes the model and (b) applied behavior analysis more appropriately describes the discipline from which this treatment approach was derived (Baer, Wolf, & Risley, 1968).

experimental designs, professional conferences, publications). A copy of the survey is available from www.wmich.edu/psychology/autismsurvey.pdf. Prior to the administration of the questions, participants were informed of the purpose of the survey and the requirements of their participation, and were provided with definitions of important terms used in the survey. Specifically, a therapist was defined as an individual who works directly with a child and whose primary responsibility is to implement the curriculum. A supervisor was defined as an individual whose primary responsibilities are supervising the therapists and managing the programs for his or her caseload.

Prior to completing the survey, participants were informed that submission indicated consent to participate in research. The survey took approximately 20 min to complete, and before submitting the completed survey participants were reminded that submission indicated consent to participate. Responses were then viewed anonymously via the Hosted Survey website.

2. Results

The results for each of the areas addressed by the survey are presented below. Note that percentages are based on the number of respondents for a specific question, which did not always equal the total number (211) of survey respondents.

2.1. Program characteristics

Eight questions addressed general characteristics of the intervention programs. When questioned about the terms that are most often used to describe the program, 29% ($n = 59$) of respondents indicated *early intensive behavioral intervention*, 25% ($n = 52$) indicated *applied behavior analysis*, 23% ($n = 48$) indicated *verbal behavior*, 19% ($n = 40$) indicated *discrete trial* instruction, and 4% ($n = 9$) indicated *Lovaas method*. With respect to published EIBI curricula, 57% ($n = 118$) of respondents indicated that their program is based on Sundberg and Partington (1998), 59% ($n = 122$) selected Lovaas (1981) or Lovaas (2003), 6% ($n = 13$) indicated Leaf and McEachin (1999), and 48% ($n = 102$) indicated that their treatment is based on more than one published curricula. The majority of respondents reported that the average client received most therapy in the home (58%, $n = 120$), while a smaller proportion selected a school (20%, $n = 41$) or clinic (13%, $n = 26$) as the primary setting. Forty-one percent ($n = 86$) of respondents reported serving more than 20 children, 24% ($n = 49$) reported serving between 11 and 20 children, and 36% ($n = 74$) reported serving between 1 and 10 children. Seventy-four percent ($n = 153$) of respondents reported that the average age of the children they served was between 2 and 5 (33% reported serving children who were 4-years old), and 26% ($n = 55$) reported an average client age of 6 or greater. When questioned about other treatment services provided by their program, many respondents indicated that speech therapy (73%, $n = 74$), occupational therapy (67%, $n = 68$), or physical therapy (14%, $n = 14$) are provided. The majority of respondents, however, did not answer this question (52% of the total sample, $n = 109$), and would possibly have selected *none* if that option had been available. When questioned about the school placement of the children served by their program, the majority of respondents (56%, $n = 107$) indicated that 81–100% of the children they serve also attend school (e.g., preschool, special education, general education) at least 10 h each week, and that many of these children have therapists from the program who support them in the classroom. Only 4% of respondents ($n = 8$) reported that their clients do not attend school.

2.2. Therapists

Eight questions concerned the therapists, who were defined as individuals who work directly with a child and whose primary responsibility is to implement the curriculum. In reference to education and certification, results indicate that the majority of therapists have completed some college (27%, $n = 57$) or earned a bachelor's degree (57%, $n = 118$), but very few hold board certification in behavior analysis. Specifically, 32% ($n = 65$) of respondents indicated that 1–20% of their therapists are certified, while 62% ($n = 126$) indicated that none of their therapists are certified. With respect to training, results indicate that the majority of therapists receive over 20 h of training (66%, $n = 134$); however, 17% ($n = 35$) reported therapists receiving only between 1 and 10 h of initial training. Therapist

training often included a combination of written instruction (79%, $n = 165$), oral instructions or lectures (95%, $n = 198$), modeling and demonstrations (96%, $n = 199$), or rehearsal with feedback (84%, $n = 175$). In fact, 48% ($n = 102$) of respondents indicated that all four of these training techniques are used. Respondents reported that initial therapist training is considered complete after a pre-specified number of hours of training have occurred (14%, $n = 28$), a pre-specified criterion has been met (33%, $n = 66$), or both (40%, $n = 81$). Many respondents also reported that therapists are required to participate in additional training sessions beyond the initial training on a weekly or monthly basis (60%, $n = 121$), and that therapists are evaluated by a supervisor at least on a monthly basis (74%, $n = 151$). Twenty-six percent of respondents ($n = 53$) reported the frequency of supervisor evaluation of therapists to be quarterly, annually, or never. Finally, results indicate that the majority of programs assign 1–2 (48%, $n = 98$) or 3–4 (59%, $n = 100$) therapists to each child's case.

2.3. Supervisors

Five questions concerned the supervisors of the intervention programs, who were defined as individuals whose primary responsibilities are supervising therapists and managing the specific programs for his or her caseload. A large proportion of supervisors have earned master's degrees and are Board Certified Behavior Analysts (36%, $n = 74$), with a similar proportion having earned a master's degrees without certification (28%, $n = 58$). Twelve percent ($n = 24$) of supervisors have a bachelor's degree and are certified as associate behavior analysts and 16% ($n = 33$) of supervisors only have a bachelor's degree. A relatively small proportion of supervisors have earned doctoral degrees, either with (6%, $n = 13$) or without (2%, $n = 4$) certification. Most supervisors oversee seven or more cases (58%, $n = 119$) and most observe the children in their caseloads at least on a monthly basis (97%, $n = 195$). Most supervisors meet with therapists to discuss their cases (98%, $n = 196$) and review case data (98%, $n = 198$) at least on a monthly basis.

2.4. Parents

Two questions addressed the involvement of parents. When asked to classify the involvement of a typical parent in the program, most respondents indicated that parents are involved in incidental or naturalistic teaching (74%, $n = 153$), while fewer respondents indicated that parents act as supervisors (3, $n = 7$), staff managers (9%, $n = 18$), or therapists (8%, $n = 17$). Further, results indicate that the majority of programs provide parents who work with their children either the same training provided to other therapists (64%, $n = 125$), or somewhat less training than other therapists (28%, $n = 55$). A few respondents, however, reported that they did not provide any training to parents (7%, $n = 14$).

2.5. Treatment

Fourteen questions addressed the treatment provided in the EIBI programs. These questions targeted several specific areas, which are detailed below.

2.5.1. Duration

Responses indicating the number of hours of behavioral treatment provided to a typical client each week were relatively evenly distributed across response options (i.e., 1–10 h: 24%; 11–20 h: 25%; 21–30 h: 28%; 31–40 h: 21%).

2.5.2. Reinforcement

Sixty-five percent of respondents ($n = 124$) indicated that a child's reinforcers are assessed using a choice-based preference assessment multiple times each day. Conversely, 19% of respondents ($n = 36$) indicating using preference assessments on a quarterly or annual basis or not at all. Eighty-seven percent of respondents ($n = 172$) indicated that therapists reserve the most powerful reinforcers for correct and independent responses, using less powerful reinforcers for prompted responses. Further, most respondents (83%, $n = 169$) indicated that reinforcement schedules are thinned (e.g., reinforcing every correct response, then every other correct response) before a skill is considered mastered.

2.5.3. Acquisition procedures

When asked to select all of the mastery criteria used for the target skills children are taught, similar proportions of respondents indicated that a certain percentage of correct trials across multiple sessions (62%, $n = 119$) or a certain percentage of correct trials across two or more therapists (61%, $n = 118$) are required. Regarding the arrangement of learning opportunities within programs, 71% ($n = 135$) of respondents indicated interspersing new targets with previously mastered targets, 15% ($n = 28$) of respondents indicated interspersing new targets in the absence of previously mastered targets, and 2% ($n = 4$) of respondents indicated using non-interspersed, massed trials. When questioned about how receptive labels or (conditional) discriminations are taught, 32% of respondents ($n = 64$) indicated that the target stimulus is always taught with other distracter stimuli present, 37% ($n = 74$) indicated that the target stimulus is first taught in isolation with other distracter stimuli introduced over time, and 23% ($n = 47$) indicated that the procedure is selected on an individual basis for each child. With respect to prompt fading, the vast majority of respondents (89%, $n = 173$) indicated that their programs use more than one prompt fading procedure, with the most frequently selected procedure (89%, $n = 173$) being the decreasing assistance (i.e., most-to-least) method.

2.5.4. Maintenance and generalization

The vast majority (98%, $n = 200$) of respondents indicated that their program includes procedures designed to promote maintenance and generalization of learning, and a large proportion indicated that therapists reintroduce previously mastered skills either in isolation or interspersed with other programs on a daily (50%, $n = 98$) or weekly (30%, $n = 57$) basis.

2.5.5. Data collection and evaluation

The majority (55%, $n = 106$) of respondents indicated that data are collected for every trial or learning opportunity within their program, 18% ($n = 34$) reported collecting data only on the first trial of each session, and 11% ($n = 21$) reported collecting data on some other subset of trials (e.g., first three trials) in each session. Seventy-four percent ($n = 144$) of respondents indicated that individuals other than the therapist monitor sessions to evaluate the reliability of data collection on at least a monthly basis and 12% ($n = 23$) reported assessing data reliability less frequently. Ten percent ($n = 20$) of respondents reported never assessing data reliability. Seventy-seven percent ($n = 144$) of respondents reported employing single-case designs to evaluate treatment effects: AB design (58%, $n = 107$), reversal design (31%, $n = 58$), multiple-baseline design (45%, $n = 83$), alternating treatments design (31%, $n = 58$), changing criterion design (34%, $n = 63$).

2.5.6. Functional assessment of problem behavior

When asked to select all of the functional assessment procedures used to assess extreme problem behavior, the most frequently selected response option was direct observation or descriptive assessment (96%, $n = 189$). Unstructured interviews (59%, $n = 115$), structured interviews (60%, $n = 117$), and experimental functional analysis (56%, $n = 110$) were also selected frequently, with the majority of respondents (86%, $n = 168$) selecting more than one response option.

2.6. Research dissemination

Forty-three percent ($n = 83$) of respondents indicated that data from their program had been presented at a professional conference, but only 18% ($n = 35$) reported that data had been published in a peer-reviewed journal.

2.7. Moderator variables

2.7.1. "Verbal behavior" programs

Several Chi-square tests were run to compare programs that described themselves using the phrase *verbal behavior* with those that do not use this phrase. Several notable differences were found. First, the sub-groups differed in the way receptive labels or discriminations are taught, $\chi^2(2, n = 199) = 6.41, p < .05$. Specifically, the largest proportion of verbal behavior programs (50%, $n = 18$)

reported that target stimuli are always taught with other distracter stimuli present, while the largest proportion of programs not using the descriptive phrase verbal behavior (39%, $n = 64$) reported that target stimuli are taught in isolation first, with other distracter stimuli introduced over time. Second, the sub-groups also differed in the way they collected data, $\chi^2(3, n = 192) = 22.47, p < .01$. Specifically, the largest proportion of verbal behavior programs (43%, $n = 15$) reported that data are collected only on the first trial, while the largest proportion of other programs (61%, $n = 96$) reported that data are collected on every trial.

2.7.2. Setting type

Additional Chi-square tests were run to compare programs in which clients receive the majority of the therapy in their home to programs in which the majority of therapy is provided in a school or clinic setting. With respect to other treatment services provided, a larger proportion of programs providing therapy in the school or clinic setting offered occupational therapy, $\chi^2(1, n = 187) = 16.08, p < .01$, or speech therapy, $\chi^2(1, n = 187) = 13.61, p < .01$, to their clients as compared to programs providing therapy in the client's home. Several notable differences with regards to therapists and supervisors were found. First, these sub-groups differed in terms of the average level of education of a therapist, $\chi^2(5, n = 186) = 16.38, p < .01$. Specifically, while a small proportion of school or clinic programs indicated that the average therapists has earned only a high-school diploma (13%, $n = 9$), only one of the home programs reported this as the average educational level of their therapists (1%). Second, the sub-groups also differed with respect to the frequency with which supervisors observe the children in their caseload, $\chi^2(5, n = 184) = 28.28, p < .01$. A much larger proportion of school or clinic programs indicated that supervisors typically observe the children daily (28%, $n = 19$) as compared to home programs (4%, $n = 5$). Similarly, differences were also found in terms of the frequency with which supervisors meet with therapists to discuss cases, $\chi^2(5, n = 181) = 12.52, p < .05$. While 8% ($n = 5$) of school or clinic programs reported that supervisors met with therapists daily, none of the home programs reported this. Finally, these two groups differed in terms of how frequently supervisors review the data for their cases $\chi^2(5, n = 183) = 17.27, p < .01$. Thirteen percent ($n = 9$) of school or clinic programs reported that supervisors review data on a daily basis, while only 3% ($n = 3$) of home programs reported this.

3. Discussion

Several findings from our survey of programs that provide EIBI services to children with autism warrant further discussion. Within the area of program characteristics, for example, it is interesting that many programs use relatively broad terms to describe themselves (e.g., EIBI, ABA) instead of their brand of treatment (e.g., Lovaas method, verbal behavior) or treatment modality (e.g., discrete trial instruction). The finding that a large proportion (48%) of program supervisors report using more than one curriculum manual is noteworthy in that it suggests that no currently available curriculum meets all program needs.

With respect to the therapists working in EIBI programs, two findings are worth noting. First, almost half (48%) of respondents reported using all four training techniques to train therapists (i.e., written and oral instructions, modeling, rehearsal, and feedback). This figure is promising because this treatment package is consistent with best practice in staff training (Reid & Parsons, 2006). Unfortunately, the finding that 26% of programs provide ongoing supervision on a quarterly basis or less frequently is discouraging, especially since quality and frequency of supervision is considered one of the most important predictors of positive EIBI outcomes (Eikeseth, *in press*).

With respect to program supervisors, it is promising that 72% of them held a master's or doctoral degree and more than half (53%) were credentialed in behavior analysis. Although certification alone does not guarantee professional competency, it does suggest that an individual has at least a minimum behavior-analytic skill set. Furthermore, certification in behavior analysis is recommended for EIBI program supervisors by the autism special interest group of the Association for Behavior Analysis International. It should be noted, however, that no studies to date have demonstrated that program supervisors credentialed in behavior analysis produce superior outcomes than those who do not. Our results also indicate that there are a substantial number of individuals without behavior analysis

certification or graduate education (16%) supervising EIBI programs. Although it is possible that some of these individuals are quite competent, it is likely that some of them do not have the skills necessary for quality program oversight and personnel supervision.

Several of our findings related to specific treatment practices deserve mentioning. First, the finding that a large proportion (65%) of programs report using choice-based preference assessments multiple times each day to identify programmed reinforcers is promising in that this represents a viable way of controlling for fluctuating preferences (Carr, Nicolson, & Higbee, 2000). It is worrisome, on the other hand, that 19% of programs report using preference assessments quarterly, annually, or not at all. Although it is possible that these programs attempt to assess children's preferences in other ways (e.g., through caregiver report), methods that are not based on objective client selection are often unsatisfactory for identifying potential reinforcers (e.g., Cote, Thompson, Hanley, & McKerchar, 2007).

Another positive finding is that 71% of supervisors report interspersing new skills with previously mastered (i.e., "maintenance") skills, an empirically supported strategy for enhancing behavioral acquisition (Dunlap, 1984). Unfortunately, only 32% of program supervisors report teaching receptive discriminations (e.g., receptive object labeling) with distracter stimuli present from the beginning of training. Receptive discriminations are conditional auditory-visual discriminations. Based on her synthesis of the discrimination training literature, Green (2001) recommended teaching these relations as conditional discriminations early in training with one target and two distracter stimuli (i.e., negative comparisons) present. Thirty-seven percent of programs begin such training with only one stimulus present, later fading in distracter stimuli. Green suggests this is an inefficient strategy that might lead to problems at the transition from simple (one stimulus) to conditional (multiple stimuli) discriminations. The present survey indicated that programs aligned with the verbal behavior approach were more likely to teach conditional discriminations using the strategy recommended by Green. This is an interesting finding because this strategy is not described in the primary verbal behavior intervention manual (Sundberg & Partington, 1998), suggesting that it has been disseminated throughout the verbal behavior community in other ways (e.g., workshops). The fact that a greater proportion of verbal behavior programs, compared to other kinds of program, report collecting data only on the first trial of a session supports this notion of alternative dissemination mechanisms as this strategy is also not recommended by Sundberg and Partington.

It is encouraging to note that 86% of program supervisors reported utilizing more than one type of functional assessment to identify the maintaining variables of problem behavior. Surprisingly, 56% of program supervisors report conducting experimental functional analysis, the most rigorous of the functional assessment methods. This represents a significant improvement over earlier data suggesting that practitioners serving individuals with mental retardation found indirect and descriptive functional assessment more useful than experimental functional analysis (Desrochers, Hile, & Williams-Moseley, 1997).

The results of the present study should be evaluated in light of at least two limitations. First, the survey was conducted over the Internet, precluding any direct knowledge of who responded. However, while the basis for the external validity of these findings is unknown, the large number of respondents does permit at least a preliminary assessment of current EIBI practices. Second, although the response rate was relatively high with 211 respondents, it is possible that the supervisors of higher quality programs were disproportionately represented in our sample. Support for this possibility includes the high proportion of supervisors reporting the use of most-to-least prompting, reinforcer schedule thinning, frequent stimulus preference assessments, and frequent experimental functional analyses—all best practices. In addition, almost half (43%) of the respondents reported presenting data from their program at a professional conference. On the other hand, the use of sub-optimal practices (e.g., infrequent supervision and data review, lack of interobserver agreement assessment) was nevertheless evident in our data. Thus, although some relevant characteristics of our sample remain unknown, it appears that we sampled a broad range of programs and practices.

In conclusion, the most striking aspect of the present data is how much variability exists within the EIBI service-delivery system. Although numerous EIBI packages have been empirically supported (Eikeseth, *in press*), the effects of multiple between-program differences in personnel and technique are unknown. Many positive program characteristics are evident in the present data; however, many negative characteristics are evident as well. We hope that this initial snapshot of current EIBI practices

will be useful to (a) program supervisors as they assess the status of their own practices; (b) graduate training directors as they evaluate the correspondence between graduate curricula and current clinical practice; and (c) researchers of behavioral treatments for autism as they identify areas of future investigation.

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