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Advantages and Challenges of a Home- and Clinic-Based Model of Behavioral Intervention for Individuals Diagnosed with Autism Spectrum Disorder

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Abstract
Researchers have demonstrated that comprehensive behavioral intervention can result in significant improvements in the lives of individuals diagnosed with autism spectrum disorder (ASD; e.g., Lovaas, Journal of Consulting and Clinical Psychology 55(1):3–9, 1987; McEachin et al., American Journal of Mental Retardation 97(4):359–372, 1993). This intervention has occurred in a variety of settings (e.g., school, home, and clinic). Even though procedures based upon the principles of applied behavior analysis (ABA) can be implemented across a variety of settings, there is often confusion about the differences and relative advantages of home- versus clinic-based settings. The purpose of this paper is to provide a discussion of home- and clinic-based intervention within the context of a progressive approach to ABA and discus possible advantages of each type of setting.

Keywords Behavioral intervention · Clinic-based · Home-based · Autism

For over the past 60 years researchers and clinicians have demonstrated the effectiveness of procedures based upon the principles of applied behavior analysis (ABA) for individuals diagnosed with autism spectrum disorder (ASD; e.g., DeMyer and Ferster 1962; Lovaas 1987; Wolf et al. 1963). Some of the first studies demonstrated that procedures based upon the principles of ABA were effective in changing behavior for individuals diagnosed with ASD. These procedures included reinforcement paradigms (e.g., DeMyer and Ferster 1962), shaping (e.g., Stuecher 1972; Wolf et al. 1963), punishment (e.g., Lovaas and Simmons 1969), and prompting (e.g., Schreibman 1975). Following evaluations of specific procedures, researchers began to evaluate the effectiveness of comprehensive behavioral intervention as it applies to individuals diagnosed with ASD (e.g., Lovaas 1987; Lovaas et al. 1973).

Lovaas et al. (1973) conducted one of the first comprehensive behavioral intervention evaluations for 20 individuals diagnosed with ASD, all of whom were between 3 and 10 years of age. The comprehensive behavioral intervention included discrete trial teaching, shaping, and differential reinforcement. Additionally, some parents were trained to implement behavioral intervention in the later stages of the study. Progress was evaluated across multiple behavioral measures and standardized assessments. Although the results demonstrated that the intervention was effective, the results also indicated that for those participants whose parents received training, continued improvement was observed, while participants who returned to state hospitals regressed.

Lovaas (1987) extended Lovaas et al. (1973) study by comparing comprehensive, intensive behavioral intervention to a minimally intensive behavioral intervention for 38 children diagnosed with ASD. The participants were quasi-randomly assigned into the intensive or non-intensive group. Students assigned to the intensive group received an average of 40 h per week of one-on-one treatment as well as parent training and support and did not receive any other treatments (e.g., speech, occupational, alternative treatments). Participants assigned to the minimally intensive group received 10 h or less per week of behavioral intervention as well as parent training and support and could participate in other treatments. The results showed that participants assigned to...
the intensive group made significant improvements while the participants assigned to the non-intensive group did not make similar gains. Parents and professionals have often referenced Lovaas (1987) as demonstrating the superiority of a home-based model (e.g., Leaf and McEachin 2008). However, the design of the study does not allow for any conclusions about the relative efficacy of home- versus clinic-based services.

Since the publication Lovaas’ seminal studies, there have been several partial replications demonstrating the efficacy of comprehensive behavioral intervention (e.g., Anderson et al. 1987; Ballaban-Gil et al. 1996; Cohen et al. 2006; Howard et al. 2005, 2014; Smith et al. 2000; Sallows and Graupner 2005), thousands of studies that have demonstrated the effectiveness of individual behavior analytic procedures for changing behavior (e.g., Soluaga et al. 2008; Taubman et al. 2001), several programmatic descriptions (e.g., Leaf et al. 2011), numerous ABA based curriculum books (e.g., Leaf and McEachin 1999; Lovaas 2003; Maurice et al. 1996, 2001), and hundreds of thousands of individuals diagnosed with ASD that have received behavioral intervention in homes (e.g., Elder et al. 2003; Sheinkopf and Siegel 1998; Harchik et al. 1992), schools (e.g., Garfinkle and Schwartz 2002; Kamps et al. 1992), universities (e.g., Harris and Handleman 2000; Harris et al. 1991), and clinic-based settings (e.g., Soluaga et al. 2008; Taubman et al. 2001). Despite the demonstration of the effectiveness of ABA-based procedures for individuals diagnosed with ASD, several unanswered questions and areas of confusion remain. These include, but are not limited to, which approach to behavioral intervention to implement (e.g., Lovaas Method, Applied Verbal Behavior, Pivotal Response Training; Romanczyk and McEachin 2016), the benefits of strict adherence to protocols (Leaf et al. 2016), the benefits of certification (Leaf et al. 2017a), and the best approach to determine the function(s) of problem behavior (Slaton et al. 2017).

Another area of confusion and debate is whether behavioral interventions should be implemented in home- or clinic-based settings (Harris and Weiss 1998). Research and clinical data have shown that behavioral interventions can be implemented effectively in multiple settings including: home settings (e.g., Sheinkopf and Siegel 1998), university based centers (e.g., Harris and Handleman 2000), school settings (e.g., Kamps et al. 1992), or clinic-based centers (e.g., Fenske et al. 1985; Leaf et al. 2011). It should be noted that it is our opinion that if professionals are well trained (cf. Ala’i-Rosales et al. 2003), behavioral interventions can, and should, be implemented in multiple settings, which can have tremendous benefits for individuals diagnosed with ASD (e.g., promoting generalization; Stokes and Baer 1977). Although there have been previous discussions dedicated to the differences between the two settings (e.g., Harris and Weiss 1998), with the increasing prevalence of individuals diagnosed with ASD receiving services in both settings, it may be important to help professionals and parents understand some differences between home- and clinic-based settings and the potential advantages and challenges of each setting.

The purpose of this commentary is to provide a definition of home- and clinic-based models of intervention and outline some potential advantages and challenges of each. While it is possible that other approaches to treatment (e.g., Early Start Denver Model [ESDM]; Rogers and Dawson 2010) pose similar or different advantages and challenges when implemented in a home- or clinic-based model, other approaches to treatment are outside of our area of experience and expertise. Therefore, all potential advantages and challenges are discussed in the context of a progressive approach to the behavioral treatment of ASD (cf., Leaf et al. 2016, 2017a). Progressive in that the approach is based on the science of applied behavior analysis, and, as such, the application of this science should progress as the science progresses. This approach has always been a hallmark of the field and is marked by critical, in-the-moment analysis and structured, yet flexible teaching (Leaf et al. 2016).

**Home-Based Model**

Within a home-based model intervention occurs primarily in the home. Typically, intervention can occur in a specific area/room or in multiple areas or rooms within the home. In a home-based model, direct line staff can be hired directly by the parents or they may be recruited, trained, and employed by a service agency. When direct line staff are hired by the parents there is usually a supervisor who is either an independent practitioner who contracts directly with the parents, or the parents contract with a service agency who provides supervision services. The supervisor typically provides initial training, curriculum development, ongoing supervision and may provide parent training. When the parents use a full-service agency, the agency hires and trains the direct line staff. A supervisor would oversee the curriculum development, provide ongoing-supervision, and any parent support.

**Potential Advantages**

Two of the authors of this paper (i.e., second and third author) started out their careers providing behavioral intervention in a home-based model as part of the UCLA Young Autism Project (Lovaas 1987). Lovaas and the authors of this paper who worked on the project felt there were some advantages in providing therapy at home for individuals diagnosed with ASD and many of these are still valid today.
Parent Involvement

One of the primary benefits of providing services within a home-based model is the opportunities for caregivers to be closely involved with therapy. Researchers have consistently demonstrated the importance of parent involvement as part of comprehensive behavioral programming (e.g., Harris et al. 1983; Ingersoll and Wainer 2013; Lovaas et al. 1973). In fact, when the second and third authors started working at the UCLA Young Autism Project parents were expected to be fully involved in treatment and provided therapy in the absence of direct line staff (Lovaas 1987). Today, it is more common that parent involvement occurs on a continuum with parents receiving support (Bearss et al. 2015), education about ASD and ABA (Bearss et al. 2015), being trained in the principles of ABA (e.g., Harris et al. 1983), and some parents implementing behavior strategies or conducting therapy (Lovaas 1987). Within a home-based model, parents may have more opportunities for direct involvement with the intervention and observation of sessions. Additionally, having parents present helps in situations where a medical emergency may occur.

Accountability

Although, certified behavior analysts are guided by ethical principles which are meant to ensure effective intervention that is comprised of evidence based procedures and is responsive to the needs of the individual (Behavior Analyst Certification Board 2014), many funding agencies and parents remain concerned about accountability. Behavioral intervention occurring primarily in the home can more readily be monitored by parents and may result in more accountability of behavior analysts for their services; while protecting against any claims of misconduct. As one parent stated while discussing the advantages of home-based intervention, “She [the child] made good progress and we [the parents] always knew what was going on” (Harris and Weiss 1998, p. 76).

Daily Living and Self-Help Skills

Individuals diagnosed with ASD commonly demonstrate deficiencies in daily living (e.g., cooking or cleaning) or self-help skills (e.g., brushing teeth or bathing; Neidert et al. 2010; Smith et al. 2012); however, with behavioral intervention, these skills can be developed (Neidert et al. 2010; Pierce and Schreibman 1994). Although these classes of behavior can be taught in both a home- and a clinic-based model, it may be more advantageous to teach them in a home-based model if clinics do not have the appropriate environment (e.g., a bathroom with a shower, a kitchen) to teach these skills.

Generalization

Another potential advantage of providing comprehensive behavioral intervention in a home-based model is that it may lead to better generalization of targeted model. Individuals diagnosed with ASD often demonstrate difficulty in generalizing skills to the home or community environment (e.g., Horner et al. 1988; Lovaas et al. 1973) and it is the responsibility of the behavior analyst to program for generalization (Stokes and Baer 1977). Providing intervention in the home may promote generalization as the therapist could easily introduce the naturally occurring contingencies within the environment where the individual spends most of his/her time (Stokes and Baer 1977). Although generalization strategies can be utilized in a clinic-based setting, home-based intervention is much more amenable for therapists to utilize strategies such as programming common stimuli.

Cost Effective

Another advantage of a home-based model is the potential cost effectiveness for parents and service providers. Given the estimated and reported costs of ABA-based intervention, up to $80,000 per year (Cidav et al. 2017), cost efficiency can be an important variable with respect to impacts of this cost (e.g., depression, bankruptcy; Sharpe and Baker 2007). Within a home-based model, caregivers do not have to bear the cost and time required for transportation and the service agency does not require treatment space. At the UCLA Young Autism Project one of the primary reasons for not providing services in the clinic was that up to seven children were receiving comprehensive intervention simultaneously and UCLA only had two treatment rooms available. Thus, within a home-based model, service agencies do not need to worry about space issues or the increased cost an office would incur.

Assessment

Home based assessments may yield greater ecological validity in the identification of real problems, especially as they occur in the home setting. Home based assessments are also ideal for observing intra-family patterns of behavior, including parent–child interactions that may be reinforcing or serve an evocative function for problematic behaviors. By conducting assessments in the home, the behavior analyst can get a better “snapshot” of behavior in the individuals actual environment as opposed to an analogue setting. For instance, conducting intervention in the home environment provides continuous opportunities
to assess and address challenging behaviors that would not be evident outside the home (e.g., rough handling of the family pet).

**Potential Challenges**

**Family Dynamics**

Within a home-based model, the family may have a greater role in influencing variables related to intervention. Sometimes these influences may align with treatment goals, in which case this influence could be an advantage. However, a home-based model does not provide any considerable advantage over other models in terms of including caregivers’ perspectives in the selection goals (e.g., caregivers are typically included in the IEP process). With respect to intervention, however, a home-based model could suffer from pressures of caregivers to implement an intervention in a certain way that might not be in the best interest of the individual. Furthermore, a home-based model requires that a parent or caregiver to be home during all sessions. That is, sessions typically will not occur in a home if only the behavior analyst and the child are present. The absence of a parent or caregiver could create a potentially unsafe environment for the behavior analyst. The absence of a parent may also increase the likelihood of cancelations. Requiring the parent/caregiver to be home during all sessions may create hardship on the family. Also, parents and siblings may be burdened with an interventionist in the home for several hours a day as the presence of the therapist may be viewed as an intrusion on the family’s privacy.

**Dual Relationships**

The direct line staff’s daily presence in the home can lead to the development of dual relationships, particularly if the staff is employed directly by the family. When working in a home-based model, interventionists are directly exposed to details of family life that would not occur if services were clinic-based (e.g., arguments, the home culture, the cleanliness of the home) and which take a great deal of clinical skills to maintain objectivity. It takes a seasoned clinician to know how to navigate these situations. These skills have been described as soft skills (Dworkin et al. 2015), which permit staff to develop therapeutic relationships with caregivers. These soft skills include, but are not limited to, clinical sensitivity; knowing what questions to ask, when to ask these questions, and when not to answer these questions; knowing how to respond to questions within the home setting; knowing how much information to provide, what information to provide, and what information not to provide.

**Logistical Pressures**

There are numerous logistical challenges of deploying staff in the community. Within a home-based model, staff may have clients that are separated in a manner that requires traveling long distances. As such, there may be pressure to lengthen the duration of each staff member’s sessions and total amount of time per week working with a specific client. This may have the effect of reducing the number of children with which staff are exposed, the variety of experience they accumulate, and the rate at which clinical skills can develop.

**Support**

The logistics of a home-based model (e.g., travel time, distances between locations, and cost of travel), may create potential problems with supporting staff. Within a home-based model it may be more difficult to ensure high degrees of treatment fidelity, provide an adequate amount of supervision and training, and provide general support for direct care staff. With staff spread across different locations, it can minimize the amount of time a supervisor can oversee staff. This can create challenges to ensure treatment fidelity across staff and clients. However, training may occur via a video following a session or during a session through video conferencing technology. While this type of training is becoming more and more available, comparison studies of in-vivo versus video review or tele-training have yet to be conducted. Additionally, due to the Health Insurance Portability and Accountability Act of 1996 (HIPAA), some funding agencies may not allow this to be an option.

**Generalization**

While a home-based model can set the occasion for generalization to frequently experienced environments (e.g., the home, a park), other areas of generalization may create challenges. Often within a home-based model, intervention is conducted by one therapist. If this is the case, it is possible that skills acquired with that therapist may not generalize to other situations that do not include that therapist. This failure to generalize to others, can create several barriers for caregivers while in the community.

**Clinic-Based Model**

Although some of the authors (i.e., second and third author) provided services in a home-based model early in their careers, they now provide the majority of services within a clinic-based model (Leaf et al. 2011). When individuals diagnosed with ASD are in a clinic-based model, they primarily receive behavioral intervention at a specific center
have included behavioral intervention implemented in school settings as part of a clinic-based model approach, it should be noted that we consider school-based behavioral intervention as a separate category (i.e., the goals, approaches, and logistics of school-based intervention create its own advantages and challenges). Within a clinic-based model, the service agency hires staff, provides training and supervision, develops curriculum, and provides parent support, education, and training. There are several advantages to implementing behavioral intervention in a clinic-based model.

**Potential Advantages**

**Staff Being Connected**

One of the primary advantages of providing behavioral services in a clinic-based model for staff, is that staff may feel more connected with other staff members and the agency. When staff provide services in one location it can set the occasion for the staff members to continually interact with each other, learn from each other, and get to know the people that work within the agency. This is virtually impossible within a home-based model when staff are working alone, in different locations, and with little to no overlap. This may be a critical component, as staff interacting with fellow employees can increase job satisfaction (Wenger et al. 2002), decrease burnout rate (Constable and Russell 1986), and, in turn, increase employee retention (Leaf and McEachin 2016). Ultimately, a clinic-based model may provide a verbal community that can help develop and maintain therapist skills to increase the fidelity and effectiveness of intervention.

**Logistics**

A critical component of intervention for individuals diagnosed with ASD is a high degree of treatment fidelity (Bibby et al. 2001; Green 1996; Plavnick et al. 2010) which can lead to meaningful gains (Bibby et al. 2001; Green 1996; Leaf et al. 2016; Plavnick et al. 2010). Furthermore, staff need to receive quality, intensive initial training and ongoing supervision (Leaf et al. 2016). A clinic-based model provides supervisors continual opportunities to provide training and supervision. Supervisors can observe sessions and staff can request support whenever they deem necessary. Secondly, because all clients are in a single location, sessions can be scheduled for a duration that is clinically optimal without concern for lost staff time due to commuting between locations. Furthermore, without having to commute between locations, an interventionist has the opportunity to observe more children in 1 day. Supervisors can also capitalize on time saved from not commuting by providing more supervision and training that can occur in one location allowing for more frequent contact with each case.

**Group Instruction**

For neuro-typical children and adolescents, the most common form of teaching occurs in a group environment (e.g., school). One important reason for this is that it is simply more efficient. If our goal is for individuals diagnosed with ASD to learn efficiently in the natural environment, it is imperative that we teach these individuals how to learn in a group instructional format. Research has demonstrated that individuals diagnosed with ASD can learn effectively in group instructional formats (e.g., Dotson et al. 2010; Leaf et al. 2012; Ledford et al. 2008) and that it can be more efficient than one-to-one instructional formats (e.g., Leaf et al. 2012). Within a clinic-based model, therapists can bring children together to work on common goals at will, without pre-scheduling that a home-based model may require. The size of the group can be modified as well, based on the number of children present and the objectives for each child. They can also provide frequent short duration group learning opportunities, which cannot be done with such ease within a home-based model.

**Social Opportunities**

One of the diagnostic criterion for an individual receiving a diagnosis of ASD is impairments in social functioning (American Psychiatric Association 2013). Perhaps the biggest advantage of a clinic-based model is the tremendous number of social opportunities it provides. Individuals are surrounded by peers throughout the day. During breaks, snack time, lunch time, play, and groups, learners have numerous structured opportunities for interaction with peers. More importantly, these opportunities provide the context for therapists to teach critical social skills that can lead to the development of meaningful friendships. These friendships can lead to connections outside the office (e.g., playdates, trick or treating together, being invited to birthdays—all of which are child initiated).

**Parental Social Network**

A clinic-based model can reduce feelings of isolation for parents. Parents of individuals diagnosed with ASD often express feelings of isolation and loneliness (Weiss 2002). For several reasons (e.g., treatment intensity, job demands, marital demands), their contact with other parents can be greatly restricted. Within a clinic-based model, parents have several opportunities to interact with other parents throughout the day (e.g., drop-offs, pickups, in-between sessions). Specifically, if a clinic has an open-door policy,
allowing parents to observe their child’s sessions, the number of opportunities for parents to interact with each other is greatly increased and can potentially reduce feelings of loneliness and isolation. In the authors’ experience, this type of policy has led to parents developing and maintaining long lasting friendships with other parents going through similar experiences.

Potential Challenges

Cost

While a home-based model may still require an office, it can be argued that the costs of a clinic-based model exceed those of a home-based model. Clinics can require monthly rent in addition to repairs and upkeep, and given that clinics require more space to operate than an office in a home-based model these costs are likely to be higher in a clinic-based model. Additionally, when providing intervention within a clinic, the directors of the clinic are responsible for purchasing instructional materials and reinforcers; where in home-based models parents usually have materials available.

Generalization

Skills developed within clinic-based interventions may not generalize to other environments; as individuals diagnosed with ASD may have tight stimulus control on that environment. If interventions that occur within a clinic are not designed to promote generalization to other environments, the skills developed within the clinic may only be useful within the clinic. Additionally, the restraints of the clinic may require that some skills be taught out of context (i.e., outside of the natural environment in which those skills should be demonstrated) which could also limit generalization. For example, teaching a skill such as making a peanut butter and jelly sandwich within the clinic is not the terminal (i.e., natural) environment for this skill. While the learner may reach a pre-determined mastery criterion in the clinic, the skill may not transfer to the terminal environment (i.e., the home kitchen).

Parent Involvement

Within a clinic-based model, parents may not be as involved as they may be within a home-based model. The abating of parent involvement could range from difficulty getting to the clinic during the business day to clinic policies on parent observations/involvement (e.g., limiting parent observations due to the presence of numerous parents creating logistical problems for the service provider). While policies on parent involvement may differ from clinic to clinic, home-based models of intervention do not suffer from the same challenges for parent involvement regardless of the clinic/s policy.

Training

Within a clinic-based model it is more likely that interventionists can work with a wider variety of clients and behavioral repertoires. While this is an advantage of a clinic-based model, it also creates a potential challenge with respect to training. It may require more thorough training for interventionists to work in a clinic-based model where they will contact a wider variety of clients and behaviors. This training may require more time and resources than within a home-based model in which an interventionist may be working with only one client.

Conclusions

Today there are more individuals receiving a diagnosis of ASD, which will likely result in more individuals requiring and receiving comprehensive behavioral intervention. As the number of individuals receiving behavioral intervention increases and there are more opportunities for programs to receive funding (e.g., state funding or insurance funding), it is important to discuss the differences between home- and clinic-based models. In doing so, funding agencies will be able to make informed decisions about the settings in which they allow services to occur. It is also important for parents of individuals diagnosed with ASD to know the differences and understand the advantages of each model. In turn, parents can decide which model is best suited for their child and their family. Additionally, if service providers know the differences and advantages between the two they can help guide individuals diagnosed with ASD and their families to select the most appropriate model.

In this paper, we provided a definition of home- and clinic-based intervention models and reviewed the advantages and challenges of each. Although the authors of this paper have moved from a home- to a clinic-based model, the purpose of this paper is not to advocate for one model over the other. Nor is the purpose of this paper to claim that one model is superior than the other model, as research has demonstrated the effectiveness of both (e.g., Lovaas 1987; Sheinkopf and Siegel 1998). In addition to a home-based model and a clinic-based model there is a third model that is typically implemented to individuals diagnosed with ASD, a school-based model. In a school-based model an individual diagnosed with ASD receives behavioral intervention in the context of their education within a school setting. It is very common that when individuals receive intervention in a school-based model they also receive intervention in a home, clinic, or combination of all three models. A school-based
model differs from a home-based model in that intervention does not occur in the context of the individuals home; and differs from a clinic-based model in that intervention is typically implemented by a teacher or paraprofessional as opposed to a trained behavior analyst.

Ultimately, the best approach may be a hybrid model (i.e., intervention occurring partly at home and partly in a center). This type of model may allow for interventionists to capitalize on the advantages of home- and clinic-based models, while mitigating the challenges of each. It is our hope that consumers of ABA will be open-minded to both models and not dismiss either for faulty reasons. Regardless of the model, several of the areas discussed here are ripe for research (e.g., comparisons of costs of home- and clinic-based models) and we hope that research with respect to these areas helps to guide professionals and caregivers when selecting a model of intervention. Along these lines, we hope that funding sources will not exclusively fund a single model as this can deprive families of important treatment options and have tremendous negative impacts to the field of ABA as it applies to autism treatment and more importantly to individuals diagnosed with ASD.

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Compliance with Ethical Standards

Conflict of interest All five authors work for an agency which provides behavioral intervention to individuals with ASD in primary a clinic based model and occasionally in a home-based model. Thus, all five authors receive a salary from this agency. The first author speaks at conferences on this topic, for which he occasionally gets an honorarium to present. The second and third author have curriculum and training materials available for purchase for which they receive royalties. The fourth and fifth author have no further conflict of interests.

Ethical Standards This article does not contain any studies with human or animal participants performed by any of the authors.

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