

## **Special Education in Juvenile Residential Facilities: Can Animals Help?**

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### **Abstract**

Children with emotional/behavioral disorders (EBD) are arguably one of the highest at-risk groups for dropping out before graduating high school. They are the group of students with disabilities who are most likely to be educated in residential facilities. Residential facilities such as Green Chimneys have incorporated animals into the treatment milieu with success. Animals have been used in various settings to improve the quality of life as well as the emotional and physical needs of people served by these facilities. This article describes the requirements for using animals in residential treatment, the limitations of such programs, and the research findings for the use of animal-assisted therapy or activities (AAT/AAA). Using Gardner's (1999) iteration of his theory of multiple intelligence, the authors proposed an understanding of how these treatments might be improve the intelligence of a child with EBD. Requirements for effective treatment of special needs children were discussed.

### **Introduction**

Students with disabilities requiring special education comprise more than 12% of all students in public schools. Of those, less than 1% are in residential facilities. However, of those students with emotional and behavioral disorders (EBD), between 3% and 4% are in residential facilities (National Center for Education Statistics, 2005). Many of these children with EBD are placed in residential settings because they are foster children with unsuccessful placements in foster homes, have been incorrigible in their biological homes, or have committed minor legal offenses. These children have often had negative experiences in school prior to being sent to live in a residential facility. They are arguably one of the highest at-risk groups for dropping out before graduating high school. Their EBD define them as special education students, even before other exceptionalities are considered.

The experience of being placed out of their homes and being separated from whatever family and friends they have is likely to be an emotionally traumatic event for children in residential treatment, even for those who describe themselves as immune from trauma. The milieu in their temporary home is critical to helping them have a successful placement. Green Chimneys, a residential facility in Brewster, New York, was developed as a boarding school in 1947. The founders developed their milieu based on the idea that interactions with animals and nature would be a method of making the transition to boarding school easier. Green Chimneys has evolved into a residential treatment facility, but their focus on the use of animals as a

therapeutic resource has remained. By incorporating animals into every aspect of their program, they find that their residents are influenced in positive ways to deal with the issues that brought them into the facility. In addition to providing a supportive milieu, Green Chimneys incorporates animals in several aspects of the resident's life, including: (1) using animals as assistants to therapy, (2) creating opportunities for the residents to become responsible for the animals' care, (3) using animal care topics for traditional learning experiences, and (4) providing opportunities for career-focused training in various fields related to animals (Green Chimneys Children's Services, 2001).

Interactions with animals can be divided into two classifications: (1) animal assisted therapy (AAT) in which the animal is used to produce or increase the positive effects of treatment for a given person or group of people, and (2) animal assisted activities (AAA) in which the animal acts as a social lubricant or distraction for a target group, with expectations of positive results but without specific therapeutic purpose. Animals have sometimes been used in both ways with the same target population. AAA usually involves volunteers who share their pets with others. AAT is used by professionals who either use animals that they control or others control as a part of a specific treatment (Fine, 2000). Green Chimneys exemplifies a residential facility that successfully uses both AAA and AAT.

The Purdy Treatment Center provides prison inmates with classroom instruction and hands-on training in employment opportunities in dog-related fields: breeding, obedience training, grooming, and specialized training of dogs for the disabled (Catanzaro, 2003b) and reports the training has success on the psychological well-being of the prisoners and staff as well as having rehabilitation success after release. Other prisons have similar programs designed with other animals as the focus (Granger & Kogan, 2000; see [www.csc-scc.gc.ca](http://www.csc-scc.gc.ca) for a list of programs in correctional facilities that have animal-based programs). Although prisons are not directly equivalent to residential treatment facilities for juveniles, successful programs in prison facilities point to a positive technique that should be considered when working with a younger, although perhaps equally troubled population.

Animal-human interaction in the service of promoting wellness is not a new concept. The York Retreat in England used animals as a therapeutic tool in 1792 (Davis, 1988; Catanzaro, 2003c; McConnell, 2002; McCulloch, 1983; Netting, Wilson, & New, 1987). Florence Nightingale suggested using pets for patients with confining and long-term illnesses (Beck & Katcher, 2003; David, 1988; Willis, 1997). In 1942, dogs were used as companions for servicemen in a convalescent hospital in Pawlings, New York (Davis, 1988; McCulloch, 1983; Willis, 1997). Levinson, a psychologist, found that the presence of his dog was useful in working with emotionally disturbed children (Catanzaro, 2003c; Davis, 1988; McConnell, 2002; Netting et al., 1987). Sam and Elizabeth Corson were among the first to attempt to research and evaluate pet-facilitated therapy (Catanzaro, 2003c). Konrad Lorenz wrote, "The wish to keep an animal usually arises from a general longing for a bond with nature. . . This bond is analogous with those human functions that go hand in hand with the emotions of love and friendship in the purest and noblest forms" (cited by Bustad, 1983). Animals have been used in hospital settings (Bardill & Hutchinson, 1997; Barker & Dawson, 1998; Hawley & Cates, 1998; Kale, 1992; Meyer, 1997), nursing homes (Granger & Kogan, 2000; Johnson, 2003; Berk & Blower, 2005), speech therapy services (Adams, 1997), prisons (Catanzaro, 2003b; Granger & Kogan, 2000;

Strimple, 2003) and schools (Ascione & Weber, 1996; Granger & Kogan, 2000; Nebbe, 1991) to improve the lives of the people served in these facilities.

Limond, Bradshaw, & Cormack (1997) found that using dogs with children with severe learning disabilities had a positive effect on both sustained focus and cooperative interactions. Law & Scott (1995) used AAT with autistic children and reported increased self-esteem, socialization, and development of language skills. Gonski (1985) and Ross (1992) described AAT as helping children regulate their own behavior while simultaneously developing empathy toward other living creatures.

Odendall (2000) used the term “attentionis egens” to describe the need for attention that is the prerequisite for successful social interactions among people. Those people whose attention needs are not being met for whatever reason (e.g., abuse and/or neglect, physical disabilities that deter others from interacting with them, or living in situations in which usual social interactions are gone) may either withdraw from contact or seek excessive contact. Children with EBD often display varying symptoms of Reactive Attachment Disorder (APA, 2000) and exhibit the behavior Odendall (2000) suggested: either withdrawing or developing behaviors aimed at getting excessive, negative, or inappropriate attention. Because these attention-seeking behaviors are not affiliative or mutually beneficial, they do not lead to successful social interactions. Thus the children’s ability to fulfill their “attention egens” is thwarted.

Interspecies interactions may be a useful substitute for fulfilling “attention egens” needs (Odendall, 2000). By getting emotional needs met, learning to care for another living creature, and developing mutually positive interactions, the child’s “attentionis egens” will be better satisfied and the symptoms of Reactive Attachment Disorder reduced. Above and beyond, however, is the hope that those children with EBD who develop positive relationships with animals can generalize their behavior to positive relationships within their species.

### **Requirements for AAT/AAA programs**

Developing an AAT/AAA program must be done with care if it is to be successful. Guidelines are available (Delta Society, 1995; Fredrickson & Howie, 2000; Green Chimeys, 2000; Hart, 2000) that speak to the importance of choosing the appropriate clients, selecting and caring for the animals, and making sure the interactions between client and animal are therapeutic and positive for both. Mallon, Ross, & Ross (2000) describe issues that are an important consideration when designing and implementing AAT/AAA programs in health or mental health organizations.

Choosing appropriate clients for animal-assisted endeavors is the first step in developing a successful program. David (1988) suggested using an assessment of each client’s history with pets and other animals as a database for using animals as stress mediators. Recognition that the attributes of a particular animal are specific to people of different cultures and histories is needed (Beck & Katcher, 2003). Although pets are popularly seen as loveable in U.S. culture, other cultures see the pets we love as dirty (Davis, 1988), if not as a source of meat (Barry, 1992). Negative experiences with certain animals or fears passed down by caretakers undermine using feared animals as therapeutic assistants (Hart, 2000; Odendall, 2000). One must remember,

however, that fear of one type of animal (e.g., dogs) does not preclude using another type of animal (e.g., cats, rabbits, birds, or fish) for therapeutic gain. Additionally, an animal that is well-trained and does not act in anticipated ways may not only provide therapeutic assistance but may produce counter-conditioning experiences that lessen clients' fears. Thus, part of an AAT/AAA program involves matching the client to an animal that can produce positive, rather than negative emotions and deselecting clients for whom AAT/AAA would be counterproductive.

Odendall (2000) believes that animals can be successfully used with people who are disenfranchised, but acknowledged that companion animals were not a panacea for all disenfranchised people. Some clients may find their need for attention fulfilled by means other than interspecies. Some people do not seem to respond positively to animals (Arnold, 1995; Lego, Knight & Connell, 1983; Miller & Lago, 1990; Ory & Goldberg, 1983; Stallones, Marx, Garrity & Johnson, 1990), while some people respond to only certain types of animals (Beck & Katcher, 2003).

A second important consideration in an AAT/AAA program is choosing appropriate animals for the program. Green Chimneys (2001) uses myriad farm and urban animals as well as a wildlife rehabilitation service in their facility. Treatment programs that are just beginning AAT/AAA activities would probably want to incorporate one activity at a time, with one animal as the principal therapy facilitator. Dogs are most often used (Granger & Kogan, 2000), although cats, birds, rabbits, horses, and aquarium fish are commonly used in AAT. In addition to choosing the type of animal, one must attend to the specific animals to be used. Not all animals are temperamentally suited for the work. They need to be (a) able to deal with the stress of novel situations, (b) open to being held or left with humans other than their handlers, (c) willing to be touched or petted in overly exuberant or clumsy ways, and (d) non-reactive to several people crowding around and/or petting them. The American Kennel Club has a Canine Good Citizen skills test (Granger & Kogan, 2000), as does the Delta Society (Arnold, 1995; Beck, 2000) for assessing the appropriateness of specific animals for AAT/AAA. Volunteers oftentimes bring their pets to AAA/AAT activities, but these animals need to be screened for their ability to stand up to the rigor of the activities in which they are being offered as participants. Handlers need to be knowledgeable of and sensitive to reactions in their therapy animals that indicate the animal has had enough and needs a break. This is true even with animals who seem well-suited to the task.

Granger and Kogan (2000) report that very little formalized training is available for those who want to participate in AAT/AAA. Volunteers have in common their love of animals, but probably not much else. To be effective in a program of this type, they need to be able to interact appropriately with the clients. They also need some training in using their animals in a manner that is useful for the people they serve. The Delta Society has a program that teaches volunteers who wish to use their pets in therapeutic ways (the Pet Partners program), but are considering other certification-providing programs. Mental health professionals and educators rarely have formal training in using animals as an adjunct to therapy and/or education. Although staff members at these residential facilities may be eager to participate, they need to have in-service training interacting with the animals, providing quality services, and assessing the outcome of services they provide. In all cases, people involved in AAT/AAA may be adept with one animal

or one species of animal, but need support in using another animal or species. Training programs are available in some areas, but may not be more than superficial (Granger & Kogan, 2000).

A final issue is risk management. Zoonotic infections (diseases transmitted from animals to humans) create some risk, although they are not as significant a problem as some might think (Anderson, Reid, & Jennings, 1992; Kale, 1992; “Patient’s Best Friend?”, 1992; Waltner-Toews & Ellis, 1994). Keeping animals well groomed and under the supervision of a veterinarian who is aware of the animals’ duties is important, both for the humans and animals involved in the program. Of greater concern are bites, scratches, or kicks from an animal. By screening the animals before they become a part of the program, training the therapy providers about dealing with potential problems, and monitoring the behavior of clients to prevent abusive or inappropriate behavior toward the animal, the risk is attenuated. Risk management should not only focus on the needs of the clients, but on the needs of the animals as well. Animals should have access to water, regular breaks from the activities, times to sleep, and freedom to engage in activities they enjoy (Granger & Kogan, 2000). David (1998) emphasized the need for planning protocols for handling the animals and preparing for expected (e.g., pet allergies) as well as unexpected events.

### **Limitations of AAT/AAA programs**

The use of animal-assisted therapy is not without its critics, including Beck and Katcher (1984, 2003). They pointed to the dearth of empirical testing as opposed to the substantial amount of anecdotal information about the value of the human-animal bond (Beck & Katcher, 1984; see also David, 1988; Granger & Kogan, 2000; McCulloch, 1983). Beck and Katcher (1984) complained that very few studies used control groups or looked at the longitudinal effectiveness of including animals in the therapeutic milieu. In their more recent article (Beck & Katcher, 2003), they acknowledged the accumulation of evidence about the significant health benefits of animal contact, both in terms of physical and psychological health (Beck and Katcher, 2003). In both, however, they criticized the dearth of information about the costs involved in animal-assisted therapy. Costs to humans include increased likelihood of getting zoonotic disease (also Arnold, 1995), increased possibility of animal bites, and the financial costs of caring for animals. Costs to the animals include increased stress in the animals, interacting with people who might be abusive or neglectful (also Arnold, 1995; Catanzaro, 2003a) or lack of concern for the animals’ welfare after buying them as part of a therapeutic milieu, (also Catanzaro, 2003a). The ramifications of withdrawing an animal from a treatment setting (Beck & Katcher, 2003; David 1988) or having the therapy animal die (Beck & Katcher, 2003) must also be studied. With the growing ability of veterinarians to prolong an animal’s life, understanding the dynamics of making decisions to choose various forms of dealing with chronic or severe illness is important (Beck & Katcher, 2003).

Beck and Katcher (2003) found that the criticisms they leveled almost 30 years earlier regarding the psychological benefits of interacting with animals have not been addressed in the literature. They commented that the benefits of being in a setting that involves plants and interacting with animals in ways other than as pets (such as hunting, fishing, or raising animals for production) need to be compared to the traditional methods of AAT. University-based programs that have research, training, and service components exist, but direct service providers

are less likely to initiate evaluations to critique the goals, parameters, and protocols needed to develop AAT/AAT as a recognized treatment option (Granger & Kogan, 2000).

### **Research findings**

In spite of Beck and Katcher's (2003) complaint, the mechanisms that lead to positive interactions between animals and humans have been studied in several contexts. From a physical health perspective, interaction with animals has been shown to lower blood pressure (Grossberg, Alf, & Vormbrock, 1988; Katcher, Beck, & Levine, 1989), decrease physiological stress reactions (Allen, Blascovitch, Tomaka, & Kelsey, 1991), and lower triglyceride levels (Anderson et al., 1992). Friedmann, Katcher, Lynch & Thomas (1980) found that patients recovering from heart problems lived an average of one year longer if they were pet owners.

From a developmental perspective, having pets may contribute to a child's learning responsibility, trust, and compassion (Ascione & Weber, 1996; Levinson, 1970). From an educational perspective animals have been used to improve reading capabilities. Animal contact may favorably influence the development of communication skills (Filiatre, Millot, & Montagner, 1983; Guttman et al., 1983). Stuttering has been known to be absent during verbal communication with inanimate objects or pets (American Psychiatric Association, 2000). The Lincoln Parish Library in Ruston Louisiana initiated a program in which children come to the library and read to dogs, prompted by the belief that dogs are accepting of a child's reading difficulties in ways that other humans are not (V. Ham, personal communication, January 8, 2005). Green Chimneys (2001) described using animals for career development by teaching skills that can be used in a variety of agricultural and pet-related businesses.

From a mental health perspective, research indicates that animals provide social support (McNicholas & Collis, 1995; Odendall, 2000; Serpell, 1996; Siegel, 1990). Service animals (primarily dogs) who have been used by people with disabilities serve as social lubricants. People who might be unwilling to talk to a person in a wheelchair or with another obvious disability will more likely to converse if the disabled person has a service animal (Eddy, Hart, & Boltz, 1988; Mader, Hart, & Bergin, 1989; Hart, 2000a; Hart, 2000b; Hart, Zasloff, & Benfatto, 1995; Messent, 1983). When animals are brought to nursing homes, the patients show improved social interactions (Beyersdorfer & Birkenhauer, 1990; Kongable, Buckwalter, and Stolley, 1989). People who live alone report having a pet compensates for lesser amounts of social contact (Hart, 2000b; Smith, 1983). Francis, Turner, and Johnson (1985) used a pre- post- design and found that elderly women in a home for chronically mentally ill residents improved in nine variables of psychological health as compared to a matched group of elderly women who received visits from the puppy handlers, but without the animals. Arnold (1995) used therapy dogs in treatment of patients who have dissociative disorders. He described positive interactions between patients and therapy dogs used in group and individual therapy and also when the patients brought their own dogs to obedience training sessions.

By taking blood levels in both humans and dogs before and after contact, Odendall (2000) found increased levels of biochemicals associated with social bonding, decreased blood pressure, and decreased levels of biochemicals associated with stress in both species following their interactions. These positive changes were greater when the human was interacting with his

or her own dog instead of an unfamiliar dog. The control group engaged in quiet book reading: they also showed indications of relaxation similar to interacting with a dog, except in a few biochemical changes in which the human-dog interaction was more positive. He concluded that setting up situations (e.g., AAT or AAA) that stimulate positive emotions can be useful in the treatment of mental problems in humans while having positive effects for the animal as well. Although the mechanisms of creating the change are not fully known, the use of AAT/AAA has the potential to become a legitimate method of helping those who struggle to have appropriate social interactions.

### **Animals as a means to developing children's intelligence**

Since the publication of Gardner's (1983) book *Frames of mind: The theory of multiple intelligences*, the use of his theory in helping educate children, particularly those who do not respond to the traditional modes of teaching has exploded (Armstrong, 1988). Gardner postulated that there are at least seven types of intelligence; he used findings from the fields of neurology and neuropsychology to support his theory. The intelligences are not used in isolation; however, one can have independent strengths and weaknesses in one or more. He has divided those seven intelligences into three general categories: those that (1) fit into the more time-honored idea of "intellectual ability" are used by mathematicians, writers, and scientists (linguistic and logical-mathematical), (2) often involve the use of bodily movements and are used by dancers, artists, architects, and athletes (musical, bodily-kinesthetic, and spatial), and (3) are used in more people-oriented professions, such as political office, sales, and mental health professions (interpersonal and intrapersonal) (Gardner, 1999). Traditional education methods rely heavily on the use of linguistic and mathematical intelligences, although there are numerous school systems and other entities designed for education (e.g., museums and zoos) that incorporate other intelligences in the learning process (Gardner, 1999).

To be considered an "intelligence" in Gardner's taxonomy, the characteristic must be used to solve problems or create products that are valued in one or more cultures. Additionally, it must involve a cognitive process that requires a person to activate neural pathways that are relatively independent of others. Thus, the ability to play the piano and the ability to sing are not separate "intelligences" because both use similar neural pathways and can be subsumed by the more general "musical intelligence."

Gardner (1999) discussed the correlation between his interpersonal and intrapersonal intelligences and Goldman's (1995) conception of emotional intelligence. Both involve "knowledge of emotions, control of emotions, and sensitivity to one's own or others' emotional states" (Gardner, 1999, p. 69). He differs with Goldman, who sees emotional intelligence as leading to positive behaviors such as empathy and compassion. Gardner believes the intelligences to be value-neutral. In his thinking, strengths with interpersonal and intrapersonal intelligence can lead to people who use their skills in life-affirming ways, such as Mother Teresa, as well as those who use their skills in destructive ways, such as Adolph Hitler. Some children in residential treatment facilities may have strong interpersonal intelligence, but may use it to manipulate others rather than to show empathy. Other children in residential treatment may be lacking in these intelligences. Odendall (2000) speculated that children who did not get their

“attentionis egens” needs met would be lacking the ability to tap into these emotional intelligences and/or the ability to use them in a positive manner.

Perhaps in interacting with animals, students in residential treatment facilities are not only getting the social benefits, but intellectual ones as well. Because they often have not had or have not availed themselves of learning and improving upon interpersonal and intrapersonal skills with other humans, the animals may become substitute teachers. Although Gardner described interpersonal and intrapersonal intelligences as being honed in relationship with other humans, the use of animals may sharpen those skills in people who have found intra-species interactions aversive (Odendall, 2000).

In a more recent publication, *Intelligence Reframed: Multiple Intelligences for the 21<sup>st</sup> Century* (1999), Gardner described an eighth intelligence that seems to fit well into his criteria for an independent intelligence: naturalistic intelligence. The naturalist recognizes and classifies the various species of living things other than homo sapiens. The person with this intelligence can appreciate flora and fauna and distinguish those that are valuable from those that are dangerous. This person can recognize new or unfamiliar organisms as akin to other more well-known organisms. The expert in the field can then develop taxonomies: Carolus Linnaeus and Charles Darwin are two well-known experts with this intelligence. Environmentalists, such as Rachel Carson and John Muir; ornithologists, such as John James Audubon and Roger Tory Peterson; and animal behavior experts, such as Barbara Woodhouse and Monte Roberts, would be exemplars of this intelligence.

AAT/AAA may be unique channels to tap into the naturalistic intelligence of students who have not fared as well in settings that focus on linguistic and logical-mathematical intelligences. By encouraging residents to interact with other species, AAT/AAA may be facilitating the residents’ intellectual development by using both naturalistic and perhaps interpersonal intelligences. Thus another mechanism that might explain the positive effects of animals for special education students in residential treatment facilities is that it strengthens the student’s use of his or her intelligence in a manner that is different from the traditional classroom (Katcher & Wilkins, 2000).

In addition, the use of multiple intelligences as a theoretical framework, allows students to begin to see themselves as capable learners (Armstrong, 1988). Students in residential facilities need to be able to think of themselves as competent learners and members of the educational/school community (Ager & Cole, 1991). For students with EBD, becoming competent learners of appropriate behavior takes priority. Currently there are numerous education strategies designed to foster these skills.

### **Current Educational Strategies**

Students with EBD are guaranteed a free and appropriate education (FAPE) as outlined by an Individualized Education Program (IEP) according to the mandates of the 1997 Individuals with Disabilities Education Act Amendments (Public Law 107-17). Current educational strategies deemed to be appropriate according to research include initiating a behavior management system based on applied behavior analysis. This system, often individually

administered according to the students' IEP, addresses behavioral change based on a functional assessment. Functional assessment data (i.e. documented antecedents and consequences of challenging behavior) provides insight into why a student engages in maladaptive behavior and gives teachers a baseline from which to build a plan of action. A behavioral intervention plan (BIP) is then designed to address problematic behavior by integrating "strategies" in the educational curriculum to track students' skills that are effective and motivating. Incorporating the use of animals as a strategy may find increased motivation for learning (Rowan & Thayer, 2000).

Current effective research-based strategies include: direct instruction in social skills and stress management techniques (Guetzloe, 2001) as well as cooperative learning and conflict resolution agendas (Prater, Bruhl, and Serna, 1998). In addition to strategies for the student with EBD, research suggests that there are effective behavioral strategies needed by teachers as well. These strategies include: direct and active teaching using manipulatives, expecting good behavior and providing feedback to students about their behavior (Guetzloe, 2001). Animals can provide direct and active teaching. Additionally, they give feedback about the student's behavior by the manner in which they react to him or her. A student who is loud or rough may find that the animal with whom he or she is partnered may break away and avoid contact until the student has calmed down. Teachers should also provide structured lessons and consistent routines (Strain & Hemmeter, 1997). The routine of caring for an animal may be an appropriate lesson for the student with EBD.

Although the current educational research includes many valid models for increasing behavioral changes in students with EBD, strategies for generalizing and maintaining new skills across various settings is lacking. Many of the aforementioned strategies may be successful in the short-term, but because secondary teachers in particular are busy professionals focusing on academic content first, behavior change techniques take a back seat. The challenge for teachers is to produce an educational outcome that integrates behavior change and academic content. This challenge is even more critical in a residential setting due to the fact that many of the students will need assistance in changing behaviors and attitudes as well as improving academic skills. Research into the long-term effects of AAT/AAA are needed to find if this is an appropriate method of helping students with EBD.

### **Innovative Approaches**

The most promising educational approach integrating behavior change and academics is a proactive strategy broadly termed positive behavioral support. Positive behavioral support or PBS is defined as multiple ways to change systems, alter environments, teach skills, and appreciate positive behavior (Ruef, et al. 1998). PBS stresses teaching students to manage their own behaviors by directly teaching a pro-social replacement behavior such as positive self-talk together with a simple self-monitoring checklist. Encouraging students to support one another by use of class-wide peer tutoring for structured practice and review (Good and Brophy, 1990) incorporates academics with social skills training. But, in order to truly benefit from PBS strategies, students with EBD must be able to generalize and maintain positive behavioral skills across a variety of environments. In order to maintain the skills, students need to be able to think

of themselves as competent learners (i.e. of behavioral skills) first, and members of educational/residential center community second (Ager & Cole, 1991).

AAT/AAA may be methods by which students in residential treatment facilities may increase their intellectual abilities and be able to think of themselves as competent learners. As such, the educational of AAT/AAA may be added to the other positive effects that the literature in AAT is finding. This program seems to have promise, but research regarding its usefulness is essential.

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