Dolphin-Assisted Therapy for Children With Special Needs: A Pilot Study

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Dolphin-assisted therapy (DAT), as a part of animal-assisted therapy and complementary and alternative medicine, yields several positive results. This study intended to add to DAT effectiveness research while using a standardized assessment. In the Ukraine, a DAT program called DolphinSwim agreed to take part in research with 37 voluntary participants. These participants were the parents of children with special needs, as defined by a variety of diagnoses, including developmental, cognitive, emotional, and physical disorders. An evaluation of five treatment programs took place during a 2-week period. The Behavior Dimensions Rating Scale was administered to program participants during pretreatment and posttreatment on site. Paired-samples t-tests indicated positive behavioral changes in children, as reported by parents. The article concludes with a discussion of the results and suggestions for future research.

KEYWORDS animal-assisted therapy, alpha-therapy, children with special needs, complementary and alternative medicine, dolphin-assisted therapy, swim-with-dolphin programs, creativity

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Dolphin-assisted therapy (DAT) is a subfield of animal-assisted therapy (AAT) in which the dolphin assists in the treatment of clients. The Delta Society is a U.S.-based leader in research and creates resources for the field of AAT. The society, founded in 1977, focuses on improving human health through positive animal interactions. The Delta Society (1996) defined AAT as:

A [goal-directed] intervention in which an animal meeting specific criteria is an integral part of the treatment process. AAT is directed and/or delivered by a health/human service professional with specialized expertise and within the scope of practice of his/her profession. AAT is designed to promote improvement in human, physical, social, emotional, and/or cognitive functioning. (p. 79)

The assistance part of DAT depends on the needs of the client. The role of the dolphin is to help clients reach their goals in therapy through a program that may include physical, occupational, and/or counseling methods. In addition to dolphin sessions, DAT programs offer multiple types of therapy to clients as a multimethod approach to healing. Therefore, difficulty arises in determining what causes client change in a DAT program—whether it is the other services involved, the dolphin, or the combination thereof.

DAT as an alternative or complement to traditional therapies shows promising results with potential health benefits (Antonioli & Reveli, 2005; Likura et al., 2001; Lukina, 1999; Webb & Drummond, 2001). The use of alternative therapies with clients promotes healing in many capacities, and DAT as part of AAT is considered a type of complementary or alternative medicine (CAM). The National Cancer Institute (n.d.) defined CAM as “...the term for medical products and practices that are not part of standard medical care. Complementary medicine refers to treatments that are used with standard treatment. Alternative medicine refers to treatments that are used instead of standard treatment” (para. 1). Some insurance companies fund CAM services as long as the treatments are shown to be empirically sound as evaluated through repeated research trials.

HISTORICAL ACCOUNTS OF DAT

Documentation of dolphin–human interactions has existed since ancient times and includes stories of dolphins saving human lives (Frohoff & Peterson, 2003). However, the use of dolphins in therapy is a new and emerging field within dolphin–human interactions. DAT has been investigated in the professional literature since the 1980s, beginning with the research of Betsy Smith (1987). Limited data on DAT yielded mixed results. However, many studies reported positive outcomes (Akiyama & Ohta, 2006;
Antonioli & Reveli, 2005; Likura et al., 2001; Nathanson, 1989; Nathanson, 1998a; Nathanson, deCastro, Friend, & McMahon, 1997; Nathanson & de Faria, 1993; Webb & Drummond, 2001). In contrast, other results were negative or inconclusive. Marino and Lilienfeld (1998) challenged Nathanson's 1998 study, and claimed it was inconclusive based on interpretation of data. In reply, Nathanson (1998b) upheld his results and accepted the design's limitations. Brensing, Linke, and Todt (2003) stated that contact with dolphin ultrasound could have an impact on biological tissue but that the duration of those contacts would be difficult to meet requirements of common ultrasound therapy. The results of Servais (1999) were inconclusive and highlighted the therapist's relationship with the child as more of a factor. Servais (1999) was in favor of more standardized research trials.

One of the populations with which DAT has shown promising results is children with special needs. Some evidence has emerged supporting the use of DAT to increase attention spans and improve interactive and play behaviors of children (Smith, 1987, 1988). Nathanson (1989), Nathanson and de Faria (1993), and Nathanson et al. (1997) found children increased verbal expression in their interactions with dolphins. Nathanson et al. (1997) reported that DAT was more cost-effective when compared with long-term traditional physical and speech therapy programs.

Kogan, Granger, Fitchett, Helmer, and Young (1999) presented two case studies on children with special needs in a DAT program. A teacher-rating scale, videotapes, and direct observation were used for assessment, which revealed improvement in most pretreatment goals. Through qualitative analysis, Lukina (1999) found improvements in sleep behaviors, verbal expression, confidence, and strength. Lotan (2007) discussed a case study of a child with Rhett syndrome and his positive experience. The current study attempted to add to the research regarding DAT effectiveness by evaluating an existing program with the use of a standardized assessment, which was lacking in previous research.

**THEORETICAL PROPOSALS**

Various theories discuss how DAT affects change, although the cause is still unknown. Martin and Farnum (2002) reported that animals may provide a way to increase attachment between children with special needs and their social environment. George (1988) and Katcher (2000) stated that once a bond forms, the experience of that learning process can transfer to a person. Animals also act as relaxation and social facilitators (Lundgren, 2004).

Cochrane and Callen (1992) reviewed multiple theories on the healing effects of swimming with dolphins. These theories included: a) chemical releases in the brain, b) unconditional love and acceptance, c) emotional release, d) brain wave connection, e) the combination of the dolphin
and water properties, f) dolphin sonar, and g) the unique intelligence of dolphins. These factors may act alone or integrate to produce change.

Nathanson (1998a) described the benefits of dolphin interaction for children with special needs using an attention-deficit theory. This theory describes children with special needs as needing more reinforcement to hold attention for learning processes to occur. Nathanson (1998a) defined the dolphin as a highly motivating reward, which can provide a unique opportunity to change behavior (Nathanson, 1989; Nathanson, 1998a; Nathanson et al., 1997; Nathanson & de Faria, 1993).

DeMares (1998) reported that a peak experience with dolphins can awaken a sense of harmony, connectedness, and the feeling of being alive. Lilly (1978) stated that dolphins are highly intelligent, which would be an important factor in their ability to relate to clients in treatment. Another possibility behind how DAT works could be the interaction of any or all of these factors.

PROGRAM INFORMATION

DolphinSwim, an Austrian company operating in the Ukraine, describes its 2-week program as alpha-therapy, a multimodal DAT concept that employs the positive effects of dolphin interaction as a stimulator for accelerated learning on physical, cognitive, psychological, and social growth. The program is 2 weeks in length because of location and funding. The main focus during the dolphin sessions is the quality of interactions between the client and the animal. The therapist acts as a mediator who facilitates the interaction. The program offers the opportunity to develop specific competencies depending on the child’s zone of proximal development. Children may be at different stages of skill, language, physical, or cognitive development.

Everything done as part of DolphinSwim’s program focuses on encouraging and supporting alpha states in clients. Alpha-therapy at DolphinSwim includes cognitive therapy, physiotherapy, cranio-sacral therapy, art therapy, and psychotherapy as part of the DAT process.

DolphinSwim (n.d.) describes its program as follows:

Alpha-therapy is a holistic form of dolphin therapy which utilizes the stimulating effects of the dolphins in a unique development program that operates on the cognitive, mental, motor skills, social, and energetic levels and also integrates the entire family. It aims to help people with disabilities and mental or chronic physical diseases. It is a complex therapy model consisting of up to [five] different therapies, depending upon the individual therapy plan. It [affects] the child’s entire being and offers the possibility of focusing on improving specific abilities. New things are learned and ‘blockages’ are dissolved. (para. 1)
In addition to dolphin sessions, each client receives several sessions in the alpha sphere. Sha (n.d.) describes how the sphere works:

Alpha sphere is a three-dimensional experience room consisting of sound, light and movement that connects a unique quality of deep relaxation with an inspiring and energizing effect. In this holistic sphere people percept specially composed sound structures and vibrations with their whole bodies—in a combination with a deep monochrome shade of blue, soft warmth and a light swinging movement. (para. 1)

The effects of dolphin interaction in combination with the course of applications as a part of alpha-therapy simultaneously promote relaxation and stimulation. Also, the anxiolytic effects (Webb & Drummond, 2001), the antidepressant effects (Antonioli & Reveli, 2005), and the motivational effects (Nathanson et al., 1997) of dolphin interaction play an important role in the therapeutic setting. DolphinSwim focuses on the use of these effects by applying cognitive and physical therapy methods based on Vygotsky’s (1978, 1986) cultural-historical activity theory.

METHODOLOGY

Participants
A convenience sample was used because of participant availability and the clinical nature of the study. A strength of this type of sampling is the minimization of volunteerism and other selection biases by selecting every available participant who meets the criteria of the study (Hulley et al., 2001). Forty parents who enrolled their children in the summer DAT programs were invited to participate in the study after they had signed up and paid for the DolphinSwim programs. The parents of 19 female and 18 male children agreed to participate. The presenting symptoms and diagnoses of the children reported by parents varied and included the following: cerebral palsy, developmental delay, developmental disorder, developmental deficits, West syndrome, mental retardation, autism, hemiparesis, encephalitis, de Morsier syndrome, Down syndrome, epilepsy, Rett syndrome, microcephaly, and Lesch-Nyhan syndrome. Most parents reported multiple diagnoses or presenting problems. Parents were selected as participants based on their ability to report their child’s behavior. Parental reports may be more valid than other forms of assessment, such as structured tests or quality sampling, because of the experience the parent has with the child. This extensive background is more than any researcher or clinician can obtain; additionally, parent reports are less influenced by performance factors (Dale, 1996).
Instrumentation

The instrument selected is the Behavior Dimensions Rating Scale (BDRS) Parent Report Form (Bullock & Wilson, 1989). The BDRS is composed of four subscales. Each subscale corresponds to multiple behavioral problems. The first subscale, Aggressive/Acting Out, is composed of behaviors such as fighting, threatening, and general social aggressiveness and hostility. The second subscale, Irresponsible/Inattentive, involves rule breaking and inattentive or irresponsible behaviors that may account for the child’s inability to meet the demands of a situation. The third subscale, Socially Withdrawn, includes shyness, timidity, self-consciousness, reluctance, and passivity. The fourth subscale, Fearful/Anxious, involves tenseness, anxiety, and distrustfulness.

Reliability/Validity

Internal consistency and test–retest reliability were calculated to address the reliability of the scales. The computed internal consistency rates were between good and excellent with a Cronbach’s alpha of 0.80 to 1. Anything above 0.70 is acceptable, and the test–retest reliability was good (Bullock & Wilson, 1989). The interrater reliability was not an issue because the same parent filled out the form each time; interrater reliability would only need to be addressed if different people filled out the pretest and posttest forms.

The BDRS has been validated with respect to content and criterion validity. In content validity, judges reviewed the questions to determine if they were appropriate indicators of emotional disturbance, and all the judges suggested additional items; thus, 14 questions were added and one of the original questions was removed in the creation of the assessment. Criterion-related validity data revealed that the BDRS significantly differentiated between groups of children labeled emotionally disturbed and those who were not (Bullock & Wilson, 1989).

Design

A quasi-experimental repeated-measures design was applied to study the following research question of the effectiveness of DAT for children with special needs:

Is there a positive change in children’s behaviors as reported by parents after completion of a DAT program?

The one-group pretest–posttest quasi-experimental design was used due to convenience sampling (Shadish, Cook, & Campbell, 2002). Random sampling was not a feasible option to create a true experiment due to the limited number of people available for study inclusion.
Procedure

The study was approved by the institutional review board of the first author’s institution. Riverside Publishing gave permission for the BDRS translation into German. A German high school teacher and two native German speakers translated the study material. DolphinSwim received specific directions on how to distribute, collect, and administer testing. One author was on site to oversee this process. An informed consent letter provided potential participants explanations of confidentiality, purposes, and uses of the research. If parents decided to participate, they received the pretest and a copy of the informed consent. Children participated in the 2-week treatment consisting of a multimodal approach as described in the program information above. After treatment ended, parents completed the posttest BDRS again for comparison.

An additional form was used to track a unique code assigned to each participant to maintain confidentiality. DolphinSwim received instructions for recording the names, codes, ages, and genders of children participating. This information was necessary for data analysis. The tracking form was kept separate from the consent and BDRS forms. Therefore, the incoming data on the pretest and posttest BDRS included no identifying information about the parents or children beyond the code to match pretest and posttest results.

RESULTS

BDRS Analysis

The results included t-test comparisons of pretest/posttest total BDRS scores and the four subscales at the .05 alpha level. The 43 questions required full completion for a total score. Out of the total 37 participants who completed pretest and posttest forms, 19 parental participants answered all questions. Figure 1 shows the frequency distribution of the mean differences between pretests and posttests for the total BDRS scores. A range of –5 to 19 was found with a normal distribution pattern.

At the group level, a significant mean difference between pretest and posttest scores greater than 0 indicated positive, parentally observed behavior change. Scores equal to or less than 0 indicated either no change or a negative change in behaviors as reported by parents. The difference between pre–post means for the total BDRS score was significant ($t = 4.148$, $p = .0003$), indicating parental perceptions of positive change (see Table 1). Using the Bonferroni adjustment for multiple comparisons (Anderson, Sweeney, & Williams, 2006), three subscales showed a significant increase in positive behavior change at $p = .0125$. The results with this adjustment indicated that Subscale 1 was not significantly different at posttest. However, parents rated their children’s behaviors on Subscales 2, 3, and 4
as improved. A Cohen’s $d$ was calculated to address effect size (see Table 1). In this study, the BDRS demonstrated moderately stable internal consistency (Cronbach’s alpha = 0.72).

**DISCUSSION**

The results suggest that during the course of a DAT program, positive change took place for participating children with special needs, as reported by parents. Given the small sample size and convenience sample, this pilot study sets the stage for future randomized studies to investigate DAT efficacy. DAT programs composed of multiple services make it difficult to determine the dolphin as causation versus the program in its entirety.

The greatest positive change seemed to occur in Subscales 3 and 4. Subscale 3 (Socially Withdrawn) measures problem behaviors related to disorders that cause aloofness. Nine participants reported a diagnosis of autism; however, many other types of developmental delays and deficiencies include withdrawn behavior. Subscale 4 (Fearful/Anxious) showed the most
change in symptoms including inhibition and anxiety disorders. Some common elements in these two scales are the presenting internalized symptoms and how clients improved by becoming more socially or verbally expressive and relaxed. Treatment elicits simultaneously a stimulating and relaxing element.

Among the results, six questions did show nonsignificant negative change. Five of the six questions relate to the BDRS Subscale 1 (Aggressive/Acting Out) behaviors. A theory in behavior modification called an extinction burst occurs when problem behaviors are being extinguished, which reflects the increase in the six aggressive/acting out items. When an extinction burst happens, frustration or aggressive behaviors can appear worse before they improve (Martin & Pear, 2007). However, these five questions were not significant, and the overall subscale of Aggressive/Acting Out did show positive, but not significant, results. In behavior modification, aggressive/acting out can become worse before behaviors come under control and change for the better.

Limitations

Because the present investigation was a pilot study, the authors expected a number of potential limitations. This was an international research study with possible language barriers. The translation of the BDRS was approved by the publisher, but this was a new format needing replication. Although multiple translators had to agree on the final format, repeated use of the form in German would be helpful to prove its reliability and validity in this language.

The design of the study also had limitations. According to Shadish et al. (2002), the limits to the one-group pretest/posttest design can include assignment, comparison groups, and treatments. These limits relate to threats on internal validity of the study. Adjustments could not be made for some measures due to the nature of the population and treatment. Use of a control or comparison group and random assignment of clients can increase the validity of results. A possibility would be to stagger DAT treatment, so the control group would later have the opportunity to participate. Time, location, and cost can make this difficult.

In addition, effect size is a limitation that is related to small sample size. Larger sample sizes reduce the possibility of Type 1 and 2 errors and have better power to detect small effects. Thus, small samples can lead to more sampling errors. This pilot study sets the stage for future research. Finally, given that parents completed the scales, this study measured their expectations and observations. The scores may be representative of the parent’s hopes and expectations and not necessarily independently observed behavioral changes.
Suggestions for Future Research

One area for future research is comparing DAT with other forms of interventions using animals. If dolphins prove to be a better choice and demand for services was to increase, there are ethical implications for the use of dolphins in captivity. These implications can include care for the animals’ social, emotional, and physical needs and how to balance numbers needed in the captive population. Another consideration is Nathanson’s study in 2007 on the use of an animatronic dolphin and real dolphins in behavior modification for children with special needs. Results from this study suggested responses to the real or the animatronic dolphin were similar.

In addition, designing research that could isolate variables within a DAT program could help to understand the mechanisms of change. In addition to dolphin work, DAT programs use multiple types of therapy, which may include alpha-therapy, art therapy, cranial-sacral therapy, physical therapy, and psychotherapy. The dolphin work itself integrates into these activities, and DolphinSwim included the above types of therapies. To create best practices, another variable to study may include the length of time and/or sessions necessary with the dolphin for change to occur. Finally the need for replication, and studies using larger sample sizes, longitudinal follow-ups, and control groups may be helpful in determining variables in DAT effectiveness.

CONCLUSION

This study shows there may be a possibility for positive behavior change in children with special needs through participating in a DAT program. This kind of research should continue to fully explore DAT variables. Results could be applied to better training in DAT and DAT standardization and certifications. These enhancements may increase quality of care and perhaps support equal access funding for children who could benefit from this type of approach.

REFERENCES


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