Critical Review:

Does animal-assisted therapy (AAT) have a positive impact on communication and social interactions in adults with dementia?

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This critical review examined the effects of animal-assisted therapy on the communication and social interactions in adults with dementia. A review of the literature yield the following study designs: single subject designs and a crossover quasiexperimental design. Results of the literature review yielded promising evidence that AAT can have a positive impact on communication and social interactions in adults with dementia. However, due to the limitations of the research evaluated further recommendations for future research are provided.

Introduction

Dementia is a condition in which multi-domain cognitive impairment, most commonly including memory impairment, is sufficiently severe to affect an individual's daily function (Camicioli, 2014). As the type and severity of dementia can vary greatly from one individual to another, a differential diagnosis can be difficult, and this has made finding a universal communication intervention for these individuals a challenge as well.

Recent research shows that dementia affects 35.7 million people worldwide and with the generation of baby-boomers getting older, the elderly population will continue to expand, potentially leading to larger numbers of individuals with dementia worldwide (Camicioli, 2014). In Canada, the total cost of care for individuals with dementia is projected to be $153 billion/year by 2038 (Picard, 2010). Thus, the need to find therapeutic forms of intervention that are effective is not only a fundamental need for individuals with dementia and their families, but a fiscal need for the economy.

Animal-assisted therapy has been defined as a goal-directed intervention in which an animal is an integral part of treatment and the delivery of this therapy must be a professional, acting within the scope of his/her practice (Kruger & Serpell, 2010). Having been delivered in a variety of therapeutic settings, AAT has shown to be an effective tool for simultaneously engaging and relaxing individuals (Kruger & Serpell, 2010). Animals often serve as catalysts of human social interactions and can help build rapport between patients and therapists (Kruger & Serpell, 2010). AAT programs currently range in their style and setting, however, incorporating animals into intervention does not have to be a costly undertaking beyond the fees to feed, shelter, and care for the animals (Mallon, Ross, Klee, & Ross, et. al, 2010).

With the aforementioned benefits of AAT already observed in other therapeutic environments, incorporating this kind of intervention within the care setting of individuals with dementia should be considered to help social communication and interactions improve.

Objectives

The primary objective of this paper is to provide a critical review evaluating the existing literature on the impact of AAT on the social communication and interactions of individuals with dementia. A second objective is to determine the clinical value of these findings and to provide evidence-based recommendations to guide clinical decision making for Speech-Language Pathologists working with individuals with dementia.

Methods

Search Strategy
Using computerized databases, such as PubMed, EMBASE, EBSCO, and Google Scholar, the following key terms were employed for searching: ((dementia)) AND ((animal-assisted therapy)) OR ((AAT)) AND ((communication)).

Selection Criteria
Inclusion criteria for article selection required that the research studies investigated the impact of animal-assisted therapy on individuals with dementia, with

specific measures regarding effects on social communication and interaction. No limits were set on the demographics of research participants (i.e. age, severity of dementia, geography) or outcome measures.

Data Collection
Results of the literature search yielded six articles based on the aforementioned criteria: single subject design (5), and crossover quasiexperimental design (1).

Results

Curtright & Turner (2002) performed a single subject design study using A-B-A-C-A withdrawal to examine the impact of a stuffed animal and live animal on communication in an 86 year old female with dementia of the Alzheimer's type (MMSE M = 14; FLCI M = 5.5. With the A-B-A-C-A design, there were 5 phases and each phase consisted of 3 observation/question & answer sessions in a single week with the stuffed animal present during phase B and the live animal during phase C; each session was videotaped and lasted ≤ 30 minutes.

The participant's responses to the experimental questions from each session were transcribed and analyzed according to information units. Visual inspection of data revealed no significant differences in information units between treatment phases, however comparison of mean frequency of total information units revealed higher scores for treatment phases when compared to baseline or withdrawal phases.

Strengths of the study include the high inter-rater (0.89) and intra-rater (0.94) reliability scores, as well as the use of accurate and appropriate discourse analysis based on published and well-documented scoring criterion.
Although the sample size was very small, this allowed for greater control of the experimental design. The methods and procedures of the therapy were clearly outlined and were appropriately designed to address the well-formulated research question proposed, allowing the methods to be easily replicated. Some of the limitations of this study include its relatively small number of conversational samples per experimental phase, the potential that an order effect could have occurred with the single participant and the sole analysis of information units as measures of communication, without considering other changes in the conversational discourse. No measures were taken outside of the therapy sessions to examine for any carryover or long-term effects on communication. Due to the restrictive nature of the sample, the overlap of variability based on the single participant's response and those limitations mentioned above, the results of the study provide an equivocal level of evidence.

Kramer, Friedmann, & Bernstein (2009) performed a single subject design to compare the verbal and non-verbal social behavior of 18 females with dementia during three different interactions: visitation by a person, visitation by a person with a live dog, and visitation by a person with a robotic dog, AIBO. Participants received one visit per condition, during which a 3-minute sample was recorded and analyzed for conversational and social behaviors (i.e. touch, looking at others, hand gestures, smiles/laughs, and initiation of conversation)

The results of appropriate repeated measures ANOVA analysis showed that the presence of the live dog and the AIBO stimulated social interactions beyond those achieved with only the author present. The AIBO induced more resident-initiated conversations (M ± SD= 3.74 ± 2.38) than when the author was alone (M± SD = 3.11 ± 2.35), however, the number of resident-initiated conversations were similar for author alone (M ± SD= 3.11 ± 2.35) and author with Golden Retriever (3.16 ± 2.46). Appropriate statistical analysis revealed no significant difference in resident-initiated conversation across treatment phases (F (2,34) = 0.736, p = 0.487).

A strength of the study is in the analysis of the data, which used repeated measures analyses to account for within-person and between-person variability. Another strength in the study is the use of a counterbalanced block design for the types of visits to prevent order effects. Limitations of this study include lack of information regarding the participants, such as mean age and mean MMSE score, as well as inclusion of participants of only one gender. The small sample size, the short length of visitations, the number of visits and the lack of long-term effects evaluations were also limitations of the study. Overall, the results of the study provide an equivocal level of evidence.

Pullen, Coy, Hunger, Koetter, Spate, & Judge (2013) used a single subject design to explore the effectiveness of animal-assisted therapy on this particular aspect [e.g. language abilities] of 105 individuals (M = 84.4 ± 6.56 years) with dementia (MMSE M = 18 points, Barthel Index = 34.6) in an acute care setting. Thirty minute group therapy sessions were conducted and observation sheets on participant mood (changes in facial expressions, gestures, laughter and decreased stress) and activity were completed. Nurses completed semi-structured narrative interviews. This data was then analyzed and descriptive statistics were performed. The statistical analysis was appropriate for this single subject study design.

Results of the study found 54% of participants showed an active behaviour during therapy and 51% demonstrated improvements in mood. Participants who were active in therapy sessions showed greater mood improvements (r = 0.814). Although women demonstrated greater improvements in mood and activity during AAT, this difference was not statistically significant. Participant data was divided into three equal age groups and results showed age had no effect on behaviour and affect.

Strengths of this study include its rationale for investigating a relatively unexplored environment, acute care settings, for the impact of AAT, and its large sample size. The selection of participants was clearly outlined with exclusion criteria. Nurse interviews revealed carryover of "dog" topics outside of therapy sessions and use of AAT subjects to facilitate communication. The study used an appropriate single subject design based on observations and nurse interviews; however, several limitations should be considered regarding the questions and conclusions of this study. The outcome measures could not be blinded due to the inherent nature of observational sheets and narrative interviews. Other limitations of the study include the lack of information regarding the activities used in therapy sessions to improve alertness, mood and communication. Also, what determined a participant to be "active" was not clearly defined. Another limitation of the study was that long term effects were not measured. The results of this research provide equivocal evidence.

Richeson (2003) conducted a single subject quasiexperimental time-series testing whether AAT intervention would increase social interactions of individuals with dementia. Fifteen participants (14 female and 1 male, M = 86.8 years of age) with dementia (MMSE M = 3.9) were chosen. AAT was delivered for one hour, five days a week for three weeks and an AAT flow sheet, previously developed based on evidence-based practice, was used to measure each participant's social interactions (i.e. Touched dog, spoke to dog, spoke to handler, reminisced about own dog, etc.).

Statistical analysis involved using SPSS for descriptive statistics, a paired-samples t-test to analyze social interactions and test the AAT flow sheets, and a one-way ANOVA to measure any changes in MMSE scores. The statistical analysis was appropriate for the study.

The results of the paired-samples t-test showed that the mean score of AAT flow sheet for interactions observed during the last week (M = 20.25, SD = 6.38) was

significantly greater than the mean for the first week (M = 15.25, SD = 7.97, t(15) = -3.257, p = .009).

This study has a number of strengths, including its thorough use of appropriate statistical analysis, its naturalistic group setting, its replicable procedures and its standardized measures for evaluating changes. Although post-test measures were taken three weeks after intervention, no long-term or carryover effects were evaluated, which is a limitation of the study. In addition, the results of the study cannot be generalized because of the small sample size and lack of randomization. The study did not review the mood- and behavior-altering medications used on a daily basis. While there are some limitations, the study provides a suggestive level of evidence.

Sellers (2006) used a single subject design to examine the effects of AAT on the social behaviours of 4 individuals (3 females and 1 male, M = 87 years of age) with dementia (MMSE M = 9). The A-B-A-B design has four phases, each phase was five days, with a two-day washout period, for a total of 28 days. Individual AAT sessions were administered in phase B. The *Social Behaviour Observation Checklist (SBOC)* was created to measure social behaviour based on smile/laugh, leans, looks, touch, and verbalization.

The results of appropriate statistical analysis showed that the overall mean of social behaviours for all participants increased significantly from baseline (M = 2.30) to treatment (M = 18.62), which reflected a statistically reliable difference (t = - 29.36, p < 0.0001).

Strengths of this study include the use of reproducible procedures and methods and the standardization of the AAT intervention to provide a higher level of control. Although this study had a small sample size, the results were interpreted with appropriate statistics and found a statistical reliable difference. The study clearly outlines what literature was used to create the SBOC, however, the use of the SBOC may be considered a limitation, in that this instrument had never been used in prior research and was created for the purpose of this study. Other limitations of the study include the lack of carryover and long-term effects reported for participant behaviour outside of therapy and the variable inter-rater reliability (range = -0.01 to 0.86). Overall, the results of this study provide a compelling level of evidence.

Yeh (2013) conducted a crossover quasiexperimental design, comparing the impact of AAT between an experimental group and a control group of individuals with dementia. 58 individuals diagnosed with dementia (M= 80 years) living in long-term care facilities were chosen to participate. There were no significant

differences in age, sex, severity of dementia and ADL among participants. Participants were equally divided into an experimental group and a control group. The experimental group participated in a 40 minute AAT program twice a week for 8 weeks. The Multidimensional Observation Scale of Elderly Subjects (MOSES), Cohen-Mansfield Agitation Inventory (CMAI) and the individual therapeutic goal (ITG) were used as evaluation tools for baseline, pre-test and post-test measures for both the experimental group and the control group.

Results of the study found that the experimental group showed significant improvement in the individual therapeutic goal fields of oral expression, movement, memory and socialization, with the most improvement noted in the area of socialization. Specifically, "keeping focusing on an activity" (p<.0001) in socialization had the greatest improvement, followed by oral expression with improvements in "focusing on the same topic" (p<.0001).

Strengths of this study include its use of standardized measures to observe change and its use of a crossover quasiexperimental design to make comparisons between groups. Significant differences were observed based on individual therapeutic goals and therapy was conducted in a naturalistic group setting. A major limitation of this study is that the findings have only been presented at a conference with online synopsis and presentation file, thus, the information has not been peer-reviewed and published outside of the research conference website. As a result of the study not being a published article, information regarding the type of statistical analysis performed was not provided. A final limitation is an absence of carryover or long-term measures. Despite not having been peer-reviewed or published, this study provides a suggestive level of evidence.

Discussion

The presented evidence must be interpreted with caution before any conclusions are drawn, as there are limitations across the studies evaluated. These common limitations include methodological weaknesses in terms of small sample sizes, undefined intervention exercises, and varied measures of communication. These factors of methodology make it difficult to compare results across studies and generalize them to other individuals with dementia. In addition, the majority of the studies were single-subject design and the one quasiexperimental design has not yet been peer-reviewed, which limits the ability to make definite clinical conclusions. The yielded research also demonstrates shared strengths, including the use of AAT in both long-term and acute care settings. All of

the six studies reported some form of positive benefit from AAT and no negative effects of using this intervention with individuals with dementia. Given the limitations and the strengths of the research yielded, more research in this area is recommended.

Conclusion

The studies reviewed provide suggestive evidence that AAT has a positive impact on the social communication and interactions of individuals with dementia. More research is needed to investigate how AAT could be systematically implemented in the clinical practice of Speech-Language Pathology and whether this intervention would produce long term effects in the area of communication for this population. As well, research is needed to evaluate whether there is a difference in the impact of AAT on social interactions when the intervention is delivered in an individual or group setting.

Clinical Implications

Due to the suggestive level of evidence provided by the reviewed studies, it is recommended that clinicians consider the use of AAT programs when working with individuals with dementia. As the literature demonstrated limitations, it is advised that any use of AAT programs be delivered in conjunction with traditional speech therapy goals and with caution in terms of individual outcomes. As mentioned, further research is necessary to determine whether AAT programs have significant long term or carryover effects and how these programs could involve Speech-Language Pathologists, however, as evident in research, this intervention can have a positive impact on the communication and social interactions of individuals with dementia.

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