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Exposing the mechanisms underlying successful animal-assisted interventions for people with dementia

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A realistic evaluation of the Dementia Dog Project: Exposing the mechanisms underlying successful animal-assisted interventions for people with dementia.

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Introduction

In recent decades, the use of animal-assisted interventions (AAI) in dementia care has received increased attention as a therapeutic approach to supporting people living with dementia. AAI is a goal-oriented and structured intervention involving supported interactions between animals and humans to provide a therapeutic benefit for the human participants (Kim *et al*, 2015). A successful AAI will be supported by a multidisciplinary team, which includes people with knowledge of both the animal and the group of individuals involved (International Association of Human-Animal Interactions Organisations, 2018). Previous research has shown that animal-assisted interactions can have a therapeutic effect on individuals with a disability (Maber-Aleksandrowicz *et al*, 2016) and in particular, for people with dementia (Olsen *et al*, 2016).

A recent meta-analysis on the use of AAI for people with cognitive impairments identified 10 studies, all of which used dogs as the intervention animal (Hu, et al. 2018). The meta-analysis found that AAI can promote positive behavioural responses in people with dementia, in line with previous research which demonstrates strong evidence that interactions with dogs can have benefits for people living with dementia in a care home setting. These include positive behavioural changes (Nordgen & Engshom, 2014; Majic et al., 2013), improved mood (Swall et al., 2015; Olsen, et al., 2016; Travers et al, 2013), increased engagement and social interaction (Marx, et al., 2013). Additionally, a positive impact on communication because of dog interventions has been highlighted (Katsinas, 2001; Velde, *et al* 2005), attributed to dogs providing an 'external focus of conversation' (Velde, et al, 2005).

While animal-assisted interventions in dementia care are becoming increasingly popular, there is a significant gap in the literature which addresses the use of animals in community settings for people with dementia (Morrison, 2007; Olsen, et al. 2016). Given there is positive evidence for the effects of dog interventions in care home settings, and that around two-thirds of people with dementia in the UK live in the community (Alzheimer's Society, 2014), a natural progression of this field is to understand the contribution dogs could make to the lives of those affected by dementia living at home. The majority of research on AAI in dementia care reports on care home settings and these findings may be useful in terms of understanding the potential outcomes of dog interventions. However, there are challenges in translating this for people with dementia living at home who have different care and support needs and may be in the earlier stages of the dementia and living with other family members or on their own. (Morrison, 2007). In particular, it does not consider role of informal caregivers and the potential benefits for promoting relationship-centred care (Nolan et al., 2002). For example, how animals may help to sustain informal care arrangements. Although there is some evidence that animal-assisted interventions can positively affect the lives of people with dementia, there is little research and only speculation about the mechanisms underlying the interventions which unlock the potential benefits.

Similarly, there is a body of literature that explores the experience of pet ownership for older people, providing insight into the potential benefits of human-animal interactions in later life. Pet-ownership can have a positive impact on alleviating loneliness, mental health problems and promoting good

health for older people (Parslow *et al*, 2005; Krause-Parello, 2012; Stanley *et al*, 2014). While pet ownership is not an animal-assisted intervention, it does draw on the potential therapeutic benefits of interacting with animals. However, while the research is promising, it does not take into consideration the complexities associated with animal interaction as an intervention for people living with dementia in the community.

This paper aims to explore the mechanisms that liberate the benefits of integrating dogs into dementia care for people living at home. Drawing on the findings of a realistic evaluation of the Dementia Dog Pilot Project, we explore the potential contribution of dogs to living well with dementia, with a particular focus on the underlying mechanisms which promote beneficial outcomes for people living with dementia.

Dementia Dog Project

The aim of the Dementia Dog project is to demonstrate how dogs can be used as an animal-assisted intervention within dementia care. The initial pilot phase of the project ran from 2013-2015 and focused on training and placing four dementia assistance dogs with couples where one partner had a diagnosis of dementia. The Dementia Dog project uses three different approaches to integrating dogs into dementia care. These are as assistance dogs, community intervention dogs and dog days day care (See http://www.Dementiadog.org for more information). This paper focuses only on dementia assistance dogs. Dementia assistance dogs are trained to live at home with a couple to provide personalised support to them. Upon application for a dementia assistance dog, the needs and suitability of the couple are assessed over a number of meetings, which are followed by supported training sessions with the couple and the dog.

Following the final placement of the dog with the couple, they receive support from the multi-disciplinary Dementia Dog team, including inputs from dementia support workers, dog trainers, vets and vet nurses, and core Dementia Dog staff members on a regular basis. This is to ensure appropriate support is provided and to monitor progress training and health needs of both the couple and the dog. While this support is ongoing, it is clear from the outset that the responsibility of caring for the dog, including providing adequate exercise and the associated financial costs, lies with the couple, in particular the spouse who does not have dementia.

Methodology

A realistic evaluation design (Pawson and Tilley, 1997) was selected due to the complexity and unique experience of living with dementia and the early stage of development of the Dementia Dog project. Realistic evaluation is a theory-driven approach to research which appreciates the complex social and physical environments in which social programmes, such as Dementia Dogs, are implemented. Importantly, its focus on understanding the context, mechanisms and outcomes of a programme can be helpful in understanding why an intervention may work for some, but not for others.

This paper presents the findings from one cycle of realistic evaluation. However, the research was carried out retrospectively. The realistic evaluation started at the end of the pilot phase of the Dementia Dog project (2013-2015) with the aim of developing a deeper understanding of the programme to inform the next phase of the project from 2016 onwards. Figure 1 outlines the time periods and activities within the programme and realistic evaluation.

[FIGURE 1 ABOUT HERE]

The dementia dog team (the implementors) created the initial programme theory (IPT) and the research team (the evaluators) became involved two years into the project. According to Pawson and Tilley (2004) ideally programme theories are explicit from the outset, in contrast Fick and Muhajarine (2019) argue that programme theories are implicit and emerge as understanding into the potential mechanisms, context and outcomes deepens through testing in practice. In this project the dementia dog team were clearer about the context and conjectured outcomes at the start than they were about the underlying mechanisms although they had some ideas about what would make this work well. This understanding was underpinned by the Theory of Change (Weiss, 1995), which influenced the early development of the programme. In this way it could be argued that there was an initial and explicit programme theory or blue print for the dog team (Figure 2) albeit that it was not yet articulated in the language of research evaluation design.

The realistic evaluation presented in this paper was carried out after the pilot phase of the Dementia Dog project was completed in 2015. Therefore, the first stage of the realistic evaluation was to work with the project team to form the Initial Programme Theory (IPT), based on the blueprint. Over the course of two meetings between the project team and the research team, the blueprint was discussed in terms of the possible context, mechanisms and outcomes to be gained from the assistance dog project.

[FIGURE 3 ABOUT HERE]

Data collection

Following the initial meetings of both teams to refine the IPT, three phases of data collection and analysis were carried out. Firstly an analysis of the documents and video updates by the couples who participated was carried out to identify possible context, mechanisms and outcomes in the pilot period. This was followed by interviews with the programme team, which aimed to develop a deeper understanding of the CMOs identified from the secondary data. The following sections outline the data sources and procedures.

Documentary analysis of Dementia Dog project team meeting records and case notes

The research team were given access to relevant meeting notes and case summaries; including the visualised case representations. In total, 138 documents were retrieved and included in the analysis. Table 1 shows the number of documents relating to each of the four couples. For each of the couples involved, there were case notes, descriptive information and visualised representation for each (see Table 1). This data covered a period of time from the initial set up of the project until the date of extraction (July 2016).

Interviews with individuals and family participating in the Dementia Dog Pilot Project

Due to the retrospective nature of this research and the changing circumstances of the participants (as described below) it was not possible for the research team to carry out primary interviews with the couples participating in the pilot. However, the research team were granted access to existing video interviews which the Dementia Dog staff routinely conducted . Interviews explored what was working well and any problems that had arisen. The audio from these videos were transcribed for

analysis. The number of family interviews included in the analysis is in table 1. Families involved in the Dementia Dog pilot were informed and consented to their data being included in the study.

Interviews with the Dementia Dog Project Team

The research team undertook semi-structured interviews with six members of the Dementia Dog Project Team. These included representatives of Alzheimer Scotland and Dogs for Good, dog trainers, project managers and dementia support workers. Interviews were audio recorded using a digital recorder and transcribed for analysis. The aim of the interviews was to understand the implications from the perspective of members of the delivery team, in terms of the perceived benefits of the project, as well as the challenges faced in delivery. Interviews topics included the participants' role in the project, understanding of the project and the outcomes for participants and lessons learned.

Data Analysis and Synthesis

The analytical approach was framed around identification and extraction of data pertaining to CMO configurations within each data set, and the patterns and threads across the cases. A preliminary analysis was undertaken using content analysis to provide an overview of context and enable initial categorisation. Each data set was interrogated to extract data segments that were meaningful in terms of possible context, mechanisms and outcomes configurations. Given the focus of this paper, careful consideration was given to the disaggregation of context and mechanisms within the data. As discussed by Dalkin et al. (2015), mechanisms were considered as a combination of resource that the intervention provides and the reasoning in response to this. This allowed an in-depth exploration of the human-animal relationship and deeper understanding of how these mechanisms affect the outcomes for participants.

To complete the analysis and 'realistic unravelling' the strongest examples of CMO configurations were tested through a data synthesis. This adopted the multidirectional approach described by Tolson et al. (2007). This involved first delineating context and mechanism and tracking outcome, and then reversing the process, thus starting from the outcome and tracing the threads to discover the mechanisms and context in which the outcome had been achieved. The purpose of this final analytical step is to identify as far as possible, the optimal configurations that achieve the most supportive outcomes for individuals and family members in terms of living the best life possible with dementia. The findings presented here forefront the role of the mechanisms and the interaction with the context to obtain positive outcomes for the person with dementia, their spouse and the dog. The aim of this is to produce a mid-range theory which can be used to develop and refine the Dementia Dog project (and similar project) following the pilot.

Ethics: Ethical approval for the project was granted by the [REMOVED]

Context: the couples

To provide context, a brief description of each couple who participated in the pilot programme along with the matched dog is provided. Pseudonyms are used to preserve the anonymity of the couples and the dogs.

Couple 1: Tom, June and assistance dog Charlie

Tom was diagnosed with vascular dementia in 2010. He is married to June, who is his main carer. June also works part-time. They were accepted on to the pilot in early 2013 and the assistance dog, Charlie was placed with them full time in March 2013. At the time of this evaluation, Charlie still lives with Tom and June.

Couple 2 – Susan, Peter and assistance dog Felix

Susan was diagnosed with Alzheimer's disease in 2009. She lived with Peter, her husband and carer. They became aware of the Dementia Dog project through their local Alzheimer Scotland resource centre and applied to take part at the end of 2012. Felix, the assistance dog was placed with them in early 2013. Felix continues to live with Peter after Susan moved into a care home in 2015. Susan has since died.

Couple 3- James, Paula and assistance dog Baxter

James was diagnosed with Alzheimer's disease in 2008. He lived with his wife,Paula who is his carer. They applied to the dementia dog project in early 2013 and Baxter was placed with them on a full time basis a few months later. James died in 2014 after being diagnosed with cancer. Sadly, Paula also died after a short illness in 2015. Baxter has now retired as an assistance dog and lives with a family friend, who was involved in supporting James and Paula with his care.

Couple 4 – Allan, Mary and assistance dog Fred

Allan was diagnosed with vascular dementia in 2011. He is married to Mary, who is Allan's carer. They became aware of the Dementia Dog programme after meeting Susan, Peter and Felix at a local dementia café and applied to participate in the programme. They were matched with Fred, the assistance dog. However, the problems with the placement resulted in Fred being removed a few months into the pilot.

[TABLE 1 ABOUT HERE]

Findings

From the data, there are three key mechanisms which are important to understand how the dementia dog project influences the outcomes for participants. These are (1) human-animal bond, (2) relationship dynamics and (3) responsibility of caring. These are discussed in turn, exploring the role the mechanisms had in affecting the outcomes for the participants.

Human-animal bond

The person with dementia and their spouse both developed their own relationship and bond with the dog. The human-animal bond is a key concept within animal assisted interventions, which conceptualises the relationship between the human and animals. This bond is based on trust and reciprocity, which positively influences the health and wellbeing of both humans and animals. For the three couples with an assistance dog who continued in the pilot programme, this bond developed quickly after the placement of the dog. The bond between the person with dementia and the dog differed from that between the dog and the carer. The dog was trained to understand that the person

with dementia was the one who was to be supported and the spouse was the one who provided care for the dog. The most pertinent example of the different relationships was explained by June, who explained how Charlie responds differently to her and Tom.

> *He's actually two dogs really. He's the dog that deals with you [Tom] and the dog that deals with me, which is entirely different.* (June)

The bond that developed between June, Tom and Charlie resulted in a number of positive outcomes for both Tom and June. For example, because of the bond between Tom and Charlie, Charlie became able to identify when Tom's mood was low and provide emotional support and regulation at these points.

> *He seems to pick up Tom's moods because well, Tom will get uptight and [the dog] will come padding through to Tom with a toy or something or give Tom a nudge and to play with and it's, the mood's gone, the mood has totally gone. (June)*

This has the dual benefit of reducing the stress of June's role as a carer, not only because she is confident in the bond between Tom and Charlie, but also because of the bond between her and the dog. There is a feeling that this bond is based on trust and an appreciation of shared responsibility in the caring role.

> *The dog takes a lot of pressure off me but there is times the dog himself is uptight and I take that off him as well. There's that bond that way. (June)*

The human-animal bond changed as the individual's dementia progressed. This was evident in two cases, both James (couple 3) and Susan (couple 2) experienced significant deterioration in their health throughout the course of the pilot, and have both since died. Although they both initially developed a close bond with their dog, they became less able to physically respond to the dog as James' dementia progressed and the couple's health deteriorated.

> *My husband James, can't respond to the dog anymore (Paula)*

This means that the potential outcomes from having an assistance dog reduced, for example, the practical tasks such as medication reminders, or increased physical activity from walking the dog. However, there were clear emotional benefits gained from the individual's bond with their assistance dog.

> *Felix has helped Susan when she has had a low day by putting his head on her lap and just sitting beside her. (Case notes)*

Additionally, the dog provided a vital source of support to the spouse in both of these situations. When James passed away, the dog provided emotional support and company to Paula to help her with her grief. Similarly, when Susan moved into a care home, Peter spoke of his bond with the dog and the support he gained from this during this difficult time.

> *Without the dog I probably would just sit in the house and well, fester away like … but I mean I get the dog out. I take him to visit, he cheers other people up in the care home as well, so we like Felix. (Peter*)

In contrast to the strong bonds the couples in the first three cases developed with the dogs, this did not happen in the fourth case. Fred, the dog initially bonded with Mary but did not respond well to Allan, who was living with dementia.

> *Fred followed Mary everywhere at the beginning which probably didn't help Allan bond with Fred (From case notes)*

A potential reason for this is that the dog was displaying some negative behaviours, which indicated that the role of assistance dog might have been a source of stress for the dog. This made Allan and Mary nervous when they were out with Fred and perhaps the lack of trust between the couple and the dog did not allow the bond to develop in the same way as the other couples.

> *Continuing to have problems with coprophagia [eating faeces] on every free run and running up fast to some dogs and people and jumping up on some walks. They have been taking him out on a flexi lead but he has been more excitable in the house due to not getting a good run. He broke the lead on one walk due to running to a dog so not practical for safety reasons and Fred needs to let off steam. (Case notes)*

The problems experienced by Mary, Allan and Fred had a negative impact on all of them. The stress experienced by Fred, meant that his negative behaviours increased resulting in increased stress for Mary and Allan when caring for him. This led to Fred being removed from the couple and retired as an assistance dog. Project case notes and recorded interviews stopped at this point, so it is not possible to explore Allan and Mary's reflections on their experience.

Relationship dynamics

The second mechanism relates to the role the dog takes within the family and the flexibility of that role as the context changes. The Dementia Dog team recruited couples who were most likely to be in a position to welcome a dog into their home. Usually, this was judged on previous experience of owning a dog, indicating the couple were open to accepting a dog into their lives and were aware of the requirements of caring for a dog. They also carefully supported the couples through the training and placing of the dog with them full time and carried out progress updates at regular intervals throughout the pilot phase. This was to ensure that the couple and dog were adapting to the new dynamic in the home, and as outlined above, the bond between the couple and the dog was developing.

> *There are elements of dog training work when having an assistance dog and we have to know who the person responsible is. We have to find carers committed to believing that this is the right course of action.* (Dementia Dog team member interview 3)

The couples' background and the support received from the Dementia Dog team were important to ensuring the dog 'fitted in' to the family and that the couple can adapt to having that third 'element' within their relationship. For the majority of the couples, the dog easily fitted into their lives and the couple spoke about the dog becoming a part of their relationship. Many participants spoke about the dog as a mediator or a buffer between the couples.

> *He gets Susan up. He brings her medicine to her and he's a buffer between the two (of us), he's, he does that perfectly for us at the moment. (Peter)*

The role the dog played within the relationship of the couple was perceived to be beneficial in a number of ways. It helped communication between the couples by giving them something to focus on and helped to facilitate sensitive conversations about the future.

> *You're not sort of directly saying to them so have you thought about how you're going to manage when you become incontinent cause the average person will say no, but if you actually said, you know, have you thought about how to manage your dog if you find you reach a point where you have an incontinence aspect. (Dementia Dog team member interview 2)*

It was felt that part of this mechanism is because the dog kept the couple focused on the here and now, without worrying about the future. This was perhaps an unexpected outcome of the project, where team members noted that couples felt their relationship had improved as a result of the dog being a part of their lives.

> *Another thing that we hadn't thought about at the time was how much they felt a couple again, that their marriage became in a much more solid footing (Dementia Dog team member interview 1)*

However, this relationship dynamic between the couple and their dog was not static. As the situation of the couple changed (context) then the relationship dynamics changed which had an impact on the outcome. As discussed above Susan (couple three) moved into a care home during the course of the pilot project. The deterioration in Susan's ability to respond to the dog and to Peter resulted in a change in the relationship between the three. Peter became more reliant on the dog for support, and the dog relied on Peter to keep up his training, as Susan was no longer able to respond to his task work. When Susan eventually moved into a care home, Peter spoke of how Felix continued to act as a 'buffer' between him and Susan and helped him have more positive visits to the care home.

> *When I used to leave the home before, Susan used to get very agitated because she knew I was leaving……but then we got to this format of using Felix as the buffer like to say I'm going, I have to take Felix out and go home cause he's needing the toilet and she'll say okay. It used to be very upsetting beforehand but now I think we, well hopefully we've solved that problem. (Peter)*

The relationship dynamic between the couples and the dogs was an important mechanism to create positive outcomes for the participants. The important thing about this relationship was that it was based on trust as a result of the human-animal bond (as described in the previous section) and that as the context changed for each couple, the relationship was fluid, ensuring that the role played by the three parties changed in response to the context.

Responsibility of caring

The final mechanism considered is the motivation the dog stimulates in the couple because the dog is reliant on the couple for care. The responsibility of caring for the dog can provide an external motivation for the couple to keep to a routine and to be active. For James and Paula, Baxter coming into their lives provided James with the motivation to go out and walk the dog daily. This came at an important time in their lives, as James was finding it difficult to come to terms with his diagnosis and had stopped leaving the house. It was the fact that Baxter needed to get daily walks that he was encouraged to go out every day.

James didn't want to go out, didn't want to do anything. He wanted to stay in the dark the whole time. When we got the dog I made him go out 'cause we dual walked the dog and made him go out just along to the shops for his paper at first and then back and again and then further and further until we were hitting the beach every day and it made such a difference. (Paula)

The outcome of this was that the person with dementia was more physically active throughout the day, this in turn was linked to a perceived improvement in mood, quality of life and wellbeing. This also linked to an increase in the social activities of the couples, as they were more likely to interact with other people within the community when they were out with the dog. The dog acted as a conversation starter and provided emotional support to the person with dementia when interacting with other people in the community.

Felix being there continues to get Susan out and about and helps with her communication when meeting friends and people stop to ask about the dog. (Case notes)

Dogs by nature are driven by routines, and this will naturally instigate a routine in the couples. For example, the dog needs a free run every day which the couple is responsible for doing, meaning they have to go out walking each day. The assistance dogs have a lot of energy and if they don't get the chance to burn some of that off in a free run, then this could affect their behaviour and task work in the home. This responsibility therefore is an important driver for motivation to be more active, which then elicits other positive outcomes for the individual, the carer and the dog. There was evidence of this in all of the cases.

CMO Configurations

The final stage of the analysis was to create CMO configurations that can help to inform the future develop of the Dementia Dog project and similar programmes. Figure 3 outlines the CMO configurations and links between the context, mechanisms and outcomes.

[FIGURE 3 ABOUT HERE]

This configuration helps to illuminate what works, for whom and in what circumstances for the Dementia Dog project. In this study, the intervention did not work for one couple which helped to illuminate the key mechanisms at play which had not been considered in the initial programme theory. The IPT highlighted companionship as a potential mechanism, however the analysis has highlighted that this is more complex and has begun to develop an awareness of facilitating a bond between the couple and their dog as well as the reciprocity of care being important for motivation.

Discussion

This paper aimed to explore the mechanisms that liberate the benefits of integrating dogs into dementia care for people living at home. In doing so, the potential for using animal-assisted interventions to produce positive outcomes for the health and wellbeing of people with dementia and family carers is uncovered. The analysis revealed three mechanisms that need to be in place to produce positive outcomes for people with dementia and their family carers. These were; the importance of fostering a human-animal bond, the responsibility of caring for the dog providing a source of external motivation to promote routine for the couple, and that the relationship is dynamic

and flexible to cope with the changes in circumstances that can be expected following a diagnosis of dementia. These findings provide both greater clarity for the selection process of matching people with a dementia dog, as well as awareness of potential problems and warning signs that could result in negative outcomes for the humans or the dogs.

This study has been one of the first to explore the potential contribution of assistance dogs to living well with dementia in a community setting. The strength of methodology (Pawson & Tilley, 1997) has provided valuable insight into the implementation of such a programme with its focus on the mechanisms most likely to result in beneficial outcomes for both the person with dementia, their spouse and the dog. However, these findings should be interpreted with caution due to a number of limitations. Firstly, the pilot programme included four couples and dogs. Although this number is small, it represents the total population of people who had a dementia assistance dog at the time of the analysis. While a strength of the data is the depth of information on the couples, and the reflection of a range of positive and negative experiences, it highlights a need for further and ongoing research that examines the experiences related to a live-in assistance dog for those with dementia. Secondly, with the exception of the interviews with team members, the majority of the data included in this analysis is secondary data collected by Dementia Dog team members throughout the course of the project. It is recognised that these data may represent the subjective perspectives of the Dementia Dog delivery team, who were not trained researchers. However, it is beneficial in that it provides a longitudinal view of the development of the pilot and provides information of the challenges faced throughout the pilot and how they were addressed. This allowed the realistic evaluation to explore how context and mechanisms affected the outcomes at the end of the pilot, and how these emerged and changed throughout the two years of the pilot. This meant that lessons could be learned from the situation where placement of the dog was not successful. In other words, the analysis has helped us to understand that the presence or absence of these mechanisms is important for understanding why the Dementia Dog project worked in some circumstances but not in others.

The findings of this study confirm the positive benefits to be gained from animal-assisted interventions for people with dementia and for family caregivers. For the person with dementia, these include mood regulation, promoting independence and improved quality of life and wellbeing of the participants. This reflects the findings of a recent systematic review of the use of animal-assisted interventions in dementia care (Yakimicki et al. 2018). However, what the current study adds to the existing body of literature is a deeper understanding of how these benefits are achieved. By recognising that animal-based interventions do not work for everyone in all circumstances and that outcomes will vary depending on each individual case, the findings provided here provide an insight into the practical aspects of delivering such an intervention.

The human-animal bond has been defined as 'a mutually beneficial and dynamic relationship' which promotes the health and wellbeing of both the humans and the animals involved (American Veterinary Medical Association, 1998). The importance of this bond and the relationship between the couples and the dogs cannot be underestimated. Selection criteria of the Dementia Dog programme required that the dog is placed with a couple to ensure that there was adequate resource to provide care and support for the dog. However, the triadic bond that was formed by the three couples and dogs who successfully participated in the pilot, showed how the different roles adopted by the person with dementia, the family carer and the dog were based on mutual trust and resulted in benefits to all three.

Further to this, the relationship that developed based on the human-animal bond needed to be adaptable in order to accommodate significant changes in family dynamics experienced by the participants. While the evidence suggests that AAI can help to maintain functioning in people with cognitive impairment (Friedman et al., 2015), disease progression will result in an eventual decline in health and functioning and changes in the family dynamic will occur as demonstrated in the findings here. The findings suggest that the relationship with the dog provided an important source of support and normality to both the person with dementia and their spouse throughout transitions or fluctuations in their family life (e.g. death of a loved one or being admitted to a care home).

The final mechanism related to the motivation the dog provided for the couples. A unique aspect of the Dementia Dog programme is that the dog lives with the couple and the couple are responsible for the care and support of the dog (with the support of the wider team). This was considered as a mechanism as the dog provided an external source of motivation for the couple to maintain a routine. This oftenprovided positive benefits for the couples (i.e. more socially and physically active, mood improvement) however, when the context changed, for example, when someone has poor health or is hospitalised the responsibility of the dog can provide additional stress and worry and result in negative outcomes for the couples and for the dog. Pet ownership in older people has been linked to increased levels of stress and poor mental health due to the burden of responsibility of having a pet and the interaction with poorer health, for example poorer mobility affecting ability to walk the dog (Parslow *et al*, 2005). Therefore, it is important that future programmes similar to Dementia Dogs explore this mechanism with potential participants and have alternative support strategies when their ability to care for the dog may become compromised. This is a key difference from the approach of other animal-assisted interventions where day-to-day care of the animal is not the responsibility of the service users.

The findings presented here indicate that the use of dementia assistance dogs promotes positive relationship-centred care in line with the Senses Framework (Nolan et al., 2002; Ryan et al., 2008). Importantly, the findings and outcomes of the research have identified mechanisms and outcomes relating explicitly to the senses of security, belonging, purpose and continuity. There is evidence of care reciprocity within the findings, as well as evidence of the dogs providing purpose and stimulation for conversation improving the feelings of belonging and continuity. The benefits relate to all three parties involved in the caring triad, highlighting the focus on relationships being a core mechanism.

The Dementia Dog programme in Scotland is currently a small project which is showing promising results in integrating dogs into dementia care. This paper explores the potential for unlocking the positive psychological and health benefits for people with dementia and their family carers by exposing three causal mechanisms that need to be considered in the development of similar projects. Conceptualising a mechanism as a hidden, but real resource (Lacouture et al. 2015) is a helpful way to view the findings of this paper and care should be given in future work to nurture these resources. The mechanisms described here should be considered mutually dependent in order to promote beneficial outcomes for families living with dementia assistance dogs, as the context of their own situation flexes and develops.

Whilst these findings lead to recommendations and considerations around the use of dogs in dementia care, future research is required to develop and expand the knowledge in this area. In particular, this paper has not explored the costs of training the dog or the level of human resource required to support one couple with an assistance dog. There is a need to understand the cost/benefit implications of

supporting a person with dementia to have a dementia assistance dog for the long-term. Additionally, it is imperative that evaluations and research projects are designed from the outset of the project, ensuring that a robust design and data collection methods are weaved throughout the delivery of the project. In terms of realistic evaluation, this will allow for the programme theory to developed at the outset of the programme and lead to an improved understanding of the outcomes and benefits of having an assistance dog for people with dementia.

Conclusion

The Dementia Dog programme in Scotland is an innovative approach within dementia care. This study has shown the contribution an assistance dog can make to living well with dementia. However, this realistic evaluation has uncovered complexities within the intervention which need to be further researched and addressed in order to ensure the future implementation of dog interventions are well planned, considered and cost-effective. Supporting the development of the mechanisms discussed within this paper will go some way to promoting positive outcomes for all involved, including the dogs. This study has positively demonstrated the potential for using dogs in dementia care and provides important information to inform future policy, practice and research in this area.

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