
Child-Canine Bonding in Children with ASD: Findings Within and Across Case Studies

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ABSTRACT

The demand for support for families impacted by Autism Spectrum Disorder (ASD) continues to grow, and one increasingly popular avenue of support is the use of companion canines. Parents searching for service canines trained to work with children with ASD, however, face formidable obstacles surrounding the availability and cost of canines. Due to these challenges, parents may seek less formal routes to support their children with ASD, often adding companion canines to their family. Despite enthusiasm, little is known about human-animal bonding in children with ASD and research identifying factors that influence children on the spectrum's ability to bond with a companion canine is meagre. Using a Family Systems approach and Bowlby's Attachment theory, this exploratory case study sought to identify the pathways through which child-canine bonding occurs and the factors contributing to this bonding process. Families (N=6), with a child aged 5-14 years with a confirmed diagnosis of ASD and their family canine, participated in the study. Findings revealed that the child-canine bond in children with ASD can be conceptualized as an attachment relationship. Furthermore, seven themes characterizing child-canine bonding emerged. Findings highlight theoretical and applied implications within the fields of human-animal interaction (HAI) and ASD.

Keywords: Autism, Bonding, Attachment, Canine, Therapy

Parents of children with Autism Spectrum Disorder (ASD) face unique challenges as they raise their children within busy social contexts and, in turn, their children often face challenges as they navigate social demands and try to fit into complex social structures (Autism Canada Foundation, 2011; Home, 2002; O'Haire 2013). Awareness of these challenges have increasingly come to the forefront coinciding with the global prevalence of ASD, a condition that has increased twenty to thirtyfold over the past four decades and is now the most common neurological disorder affecting children (current figures are one in every 68 children are

diagnosed; Center for Disease Control and Prevention, 2014). ASD is a lifelong developmental disability defined by criteria in The *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*, which includes deficits in social communication and social interaction along with restricted, repetitive patterns of behaviour, interests, or activities (American Psychiatric Association, 2013).

A pervasive characteristic of children with ASD is their difficulty establishing adult-child and peer-peer relationships (Autism Canada Foundation, 2011; O’Haire, 2013). As such, children with ASD may struggle with social interactions and in particular, with their ability to engage with peers. Social isolation can often result in children with ASD being excluded from activities that both provide a source of joy as well as serve to promote their development (O’Haire, McKenzie, McCune, & Slaughter, 2013). O’Haire and colleagues (2013) assert that social isolation and a lack of social interactions early in the neurological development of children with ASD may lead to further impairment of neurotypical behavioural development, creating a cycle of increasing behavioural disturbances. The demand for support for social skills development for children on the spectrum continues to grow and one increasingly popular source of support is the use of human-animal interactions (HAI).

The field of HAI explores the bond between humans and animals and the role the human-animal bond plays in empathy development, social development, the ability to form and express attachments, reaction to grief and loss, the challenges of aging, and other developmental passages throughout the lifespan (Human-Animal Interaction, 2015). In addition, the field of HAI examines the role of animal-assisted therapy (AAT) in prevention and intervention programs within a variety of settings. Interactions with animals can contribute to the

development of a child's sense of self, imagination, play, empathy, and social responsibility (Ascione 2005; Fine, 2010; Jalongo, 2015; Melson, 2001; Solomon, 2010).

Individuals with ASD, and in particular non-verbal individuals, may have difficulty comprehending the thoughts and feelings of their peers and may negotiate their environments through the use of sensory-based thinking (i.e., children with autism may process their world by literal sensory perceptions such as through shapes, smells, tastes, sounds, or texture) (Grandin & Johnson, 2005). It has been argued that during interactions with animals, children with ASD perceive animals as non-judgemental and their interactions are not influenced by the socio-communicative expectations of typical human relationships (Friesen, 2010). The absence of the necessity to "read" an animal's mind may provide an explanation for the increased ability of a child with ASD to interact in a social way with an animal (Solomon, 2010). This unique interaction offers typical and atypical children a valuable form of social and emotional support (Friesen, 2010). For children with ASD, negotiating social relations can be especially challenging (Bystrom & Persson, 2015). Because of these challenges in establishing and maintaining social connections, bonding with a companion animal may lead to opportunities to practice social interactions and facilitate subsequent social connections to others (Bystrom & Persson, 2015).

A meta-analysis by Nimer and Lunahl (2007) investigating AAT found that AAT contributed to improved behavioural symptoms associated with ASD (e.g., reduced levels of anxiety and emotional outbursts, increased calmness and overall happiness, and increased prosocial behaviors), and canines were the therapeutic animal associated with the most significant benefits. Canines in particular provide behavioral feedback that may be easily read by young children, facilitating social interactions that do not require the interpretation of verbal

cues (Solomon, 2010). This nonverbal engagement is especially important for children with ASD, given their potential difficulties participating in social interactions requiring verbal exchanges (Solomon, 2010).

Due to the benefits arising from canine-assisted therapy, parents with children with ASD have become increasingly intrigued by the therapeutic effects of service canines (Burrows, Adams, & Spiers, 2008). A family's decision to add a service canine, a canine with specific training and temperament to support a variety of individuals with disabilities, to the family is supported by peer-reviewed findings in HAI attesting to the benefits of the human-animal bond for children with ASD (e.g., Carlisle, 2012; Fine, 2010; Grandin, 2005; Levinson, 1984; O'Haire, 2013). However, parents searching for service canines trained to work with children with ASD face formidable obstacles surrounding both the availability and cost of these canines. According to the Canadian National Service Canines (NSD) training centre, there is currently an 18-24 month waiting list for a service canine at a cost of \$18,000 CDN (NSD, 2012). Even if funds are available, the wait time is a deterrent for many families as the implementation of early intervention strategies is key to the developmental well-being of newly diagnosed children (Autism Speaks, 2015; Johnson, 2015). Due to the inaccessibility of service canines and in response to the need to provide support to children early in their development, parents may seek less formal routes to support their children with ASD, often adding companion canines (i.e., a pet with no specialized training) to their family.

Despite enthusiasm for integrating companion canines into the care plan for children with ASD, research examining human-animal bonding in children with ASD and the mechanisms through which child-canine bonding occurs within this population is limited. Further, research identifying factors that influence children on the spectrum's ability to bond with a companion

canine is meagre (Berry, Borgi, Francia, Alleva, & Cirulli, 2013). There is a dearth of research examining how the child, the family canine, and the family itself influences a child on the spectrum's ability to bond with a companion canine.

For a child with ASD, an attachment to a canine companion may provide a positive relationship experience, opportunities for social skill development and, in turn, increase the willingness of these children to seek additional social relationships. A key challenge with research in this area has been the lack of identified theoretical rigor supporting the investigation of the ideas, concepts and definitions that underpin the notion that humans can form strong attachments to animal companions (Beck & Madresh, 2008; Hosey & Melfi, 2014; Rockett & Carr, 2014). Two distinct yet mutually informing theories inform our current investigation: 1) Family Systems approach (Bowen 1976; 1978); and 2) Bowlby's Attachment Theory (Bowlby 1969; 1979; 1988).

The Family Systems approach (Bowen, 1976; 1978) is a framework describing families as a system of interconnected and interdependent individuals. To understand an individual, we must understand the family system of that individual. Children are embedded within multiple systems that interact both directly and indirectly to influence development and behaviour; the most important influence being the family system (Bronfenbrenner, 1979). Bronfenbrenner (1979) asserted that the family system is the most important influence on children and subsequently impacts how they develop, behave, and perceive their environment. The Family Systems approach sheds light on how influential the family system is for a child with special needs and more specifically, for a child with ASD. When families integrate a canine into their home and view the canine as a significant member of the family, the family canine becomes a

sub-system within the complex family system (Jalongo, 2015). From this perspective, family companion canines become nested within the family social system (Jalongo, 2015).

Bowlby's attachment theory (1969; 1979) was initially proffered to explain the development of deep emotional bonds characterizing close relationships. Bowlby (1988) described attachment as a lasting psychological connection between human beings characterised by four distinguished features: 1) Their physical nearness and accessibility are enjoyable (proximity maintenance); 2) They are missed and become anxious when absent (separation distress); 3) They are dependable sources of comfort and provide a base from which to explore the environment (secure base); and 4) They are sought to alleviate distress (safe haven). These interaction characteristics, in turn, have been used to identify the level of attachment between a child and his/her parents (Bowlby, 1969).

It merits noting that not all of young children's attachments are to fellow human beings (Jalongo, 2015). Children can become attached to companion animals and display classic attachment behaviours, including: seeking close physical contact (proximity seeking), protesting separation/striving to be reunited (separation anxiety), communicating through touch and nonverbal cues, acting as a base of security from which the child can explore the surrounding environment (secure base) and turning to the other for comfort (safe haven) (Melson, 2003).

The use of these two theoretical frameworks, Bowen's (1976; 1978) Family Systems Approach and Bowlby's (1969; 1979) Attachment Theory served to guide and support the current study, helping to identify research questions, giving direction to the interviews and subsequent discussions, and providing an overall conceptual framework supporting the focus of the investigation of bonding between children with ASD and their companion canines. The purpose of this exploratory case study was to understand child-canine bonding with a focus on

identifying the factors contributing to bonding in children with ASD to their family canines. The two overarching research questions that guided this study included:

1. Is there evidence that the attachment components of safe haven, secure base, proximity seeking, and separation anxiety are evident features of the child-canine relationship? If so, to what extent are these four features of attachment evident?; and
2. What are the prevalent themes emerging from interviews and observations of canine-child bonding?

Methods

Due to the exploratory nature of this study and the paucity of research elucidating factors impacting the child-canine bond, a qualitative approach using case study methods was deemed best suited to uncovering answers to the above-stated research questions. As Richards and Morse (2013) suggest, qualitative research is useful in generating new ideas and theories and examining an area where little is known and findings remain scarce. Further, case study methods are well suited for exploring new processes, of which there is little understanding (Baxter & Jack, 2008). Due to the dearth of research exploring the child-canine bond for children with ASD, case study methods hold potential to uncover, identify and highlight key dimensions of the child-canine bond.

Participants

Six families were recruited to participate in this study. In order to ensure specificity for this study (i.e., that families met pre-specified criteria), each case consisted of: 1) a family with a child aged 5-14 years with a confirmed diagnosis of ASD; 2) and their family canine. The child must have been receiving or had received autism funding which, according to criteria established

by British Columbia's Ministry of Children and Family Development, requires a confirmed diagnosis of autism by a qualified specialist (i.e., paediatrician, child psychiatrist, or registered psychologist). Only children diagnosed with ASD level 1 or 2 (requiring low to moderate support) were included in this study due to the increased ability for this particular population to engage in verbal and nonverbal communication and comprehend social overtures (American Psychiatrist Association, 2013).

The inclusion of a companion canine, a canine who had not received specialized therapeutic training as a service or a therapy canine, was a requisite for participation in this study. Recall that given there is currently an 18-24 month waiting list for a service canine in British Columbia and that procuring a trained service canine for a child with ASD is both costly and involves a wait-list (Canadian National Service Canine, 2012), families may seek canine therapeutic support via less formal channels. In light of this, family canines were restricted to companion canines with no formal therapeutic or service training as this was determined to be representative of a typical family's experience.

Recruitment

In compliance with university human (#H15-01479) and animal (#A15-0182) ethics, parents provided written consent to participate and children provided verbal assent. Families were recruited from within the municipality of a mid-sized western Canadian city. To ensure that the majority of canine-owning families had an equal chance to participate in this study, flyers were posted at the eight on/off leash canine parks throughout the city for four weeks. These flyers were, in turn, circulated via social media by both the researcher and via informal sharing by the public (e.g., photos of flyers were posted on autism support groups on Facebook).

The first six families to sign up for the study who met the inclusion criteria were included in the study.

Data Collection

In this study, three main data sources were used to gather information: 1) semi-structured interviews with the parent(s); 2) field notes; and 3) observations of child-canine interactions.

The primary form of data collection was in-depth, semi-structured interviews with the parents which lasted, on average, 40 minutes (i.e., *range* = 27 - 64 minutes) and were digitally recorded and subsequently transcribed. All of the interviews were conducted in each respective family's home with the participants choosing a time to be interviewed that was most reflective of a typical family experience. Demographic information (e.g., information regarding the family, their child's ASD diagnosis, previous experience with animals, and information about their companion canine) was collected via a brief questionnaire administered prior to the interview.

Field notes were recorded immediately following each interview and during the collection of observational data. This provided an opportunity for the researcher to reflect and include additional information regarding the interview process. This included information such as characteristics of the child, characteristics of the companion canine, characteristics of the family unit, and any additional information offered by the participants (e.g., one family discussed the need for the school system to allow children with ASD be accompanied by their companion canine in the classrooms).

Observation, unlike other research methods used to gather information on children, does not depend on the participant's ability to understand or produce speech; therefore, as a research technique, the use of an observational case study was well suited for gathering data on children

with ASD who may have limited verbal communication skills. Observational data collected at one time point consisted of observing child-canine and family interactions

Data Analysis

In order to address the two research questions driving this study, notably, “What features of Bowlby’s attachment theory are evident in the child-canine bond?” and “What are the themes characterizing child-canine bonding”, a two-step process of data analysis was used.

First, the digitally recorded interviews and observation field notes were transcribed. During this transcription process the data was reviewed for patterns and preliminary notes were made as to potential thematic codes. Following transcription, in order to increase familiarity with the data, a detailed reading and re-reading of each case’s transcript was conducted (Sandelowski, 1995; Spradley, 1979). This allowed the identification of global or general themes from each data source to inform our research questions.

The second step in analyzing the data involved a more exhaustive process. In order to complete a more in-depth analysis the lead author first examined what, if any, features of attachment were prevalent in the child-canine bond using directed content analysis. Next, conventional content analysis (Hsieh & Shannon, 2005) was used to identify the personal and external factors influencing child-canine bonding. These factors included interactions between the child, the family canine, and the family that facilitated bonding.

Analysis of Attachment Theory Using Directed Content Analysis

In contrast to conventional qualitative analysis that generates thematic codes found within participant-generated data, directed content analysis uses themes derived from previous research as a framework for analyzing data (Hsieh & Shannon, 2005). Given the key features of attachment (i.e., proximity maintenance, separation anxiety, safe haven, and secure base) had

been identified as part of Bowlby's (1969, 1979, 1988) attachment theory, these features of attachment were used to generate open-ended questions to explore child-canine attachment for our study.

Coding began immediately with the predetermined codes (i.e., proximity maintenance, separation anxiety, safe haven, and secure base). First, each case was analyzed individually ($N = 6$) and the frequency for each of the predetermined codes was tallied using NVivo™. Finally, a cross-case analysis was done where the number of codes from each coding category was combined and a composite score was tallied (see Table 1).

The Identification of Emerging Themes Using Conventional Content Analysis

Given that existing theory and research literature on human-animal bonding in children with autism is limited and that themes describing the child-canine bond have not previously been identified in educational or psychological literature, conventional content-analysis was used to identify the personal and external factors influencing child-canine bonding including interactions between the child, the family canine, and the family unit. Conventional content analysis involves a “systematic classification process of coding and identifying themes or patterns and is used to make sense out of participant generated data” (Hsieh & Shannon, 2005, p. 1278). Given the dearth of empirical work on child-canine bonding in children with ASD, this approach offers advantages over other content analysis approaches (i.e., directed content analysis).

Using conventional content analysis, an individual case analysis was completed for each of the six cases in which initial global themes were developed. Identifying the prevalent themes was done in two stages. First, each transcript from each case was reviewed independently by both two experienced qualitative researchers, who identified general or global initial themes (e.g., canine acquisition, canine as family member, family profile). These themes were pooled

across raters and resulted in 32 general or global categories. The second step involved a winnowing process (Wolcott, 1990) whereby global themes were discussed by raters and collectively grouped into thematic categories. This was done to reduce redundancy (e.g., “change to child behavior” and “benefits to child” were merged). This process resulted in nine winnowed themes.

Following the completion of an individual case analysis for each of the six cases, a cross case analysis was then done. Using the identified themes from each individually analyzed case, the cases were then compared to determine if there were similar patterns and themes across cases. These themes were then used for within and between case study comparisons in order to identify commonalities and differences resulting in a total of seven themes (see Table 3). To assist the coding process, descriptions and examples of each theme were identified and listed next to the theme (e.g., theme = canine as family member; description = treatment of canine as part of the family unit; examples = allowed on furniture, permitted to sleep on the child’s bed, travels with family). Finally, an individual case analysis was completed using the 7 themes to identify the presence or absence of each theme within the individual cases (see Table 4).

Results

Recall that the first aim of this study was to determine if support was evident in the observations of child-canine interactions for Bowlby’s (1969; 1979; 1988) Attachment Theory – could Bowlby’s theoretical framework, specifically his four pillars of attachment, be used to describe child-canine attachment in our population? The second aim was to identify the key themes characterizing child-canine bonding emerging from interviews, field notes, and observations of children with ASD interacting with their companion canine. This section will first report the findings in support of the first research question, including the prevalence and

examples of participants' responses corresponding to each of Bowlby's four features of attachment. Following this, the prevalent themes emerging from a cross-case analysis will be presented.

Support for Bowlby's Attachment Theory

One of the guiding questions in this research study was whether the child-canine bond in children with ASD could be conceptualized as an attachment relationship and to what extent these features of attachment are evident. Table 1 illustrates the extent to which each component of attachment is evident in each individual case which is then followed by a total score where each category is combined and a composite score is tallied.

To contextualize and illustrate the four features of child-canine bonding, each feature of attachment is described in Table 2 (from the most prevalent to the least prevalent) including excerpts from participant interviews supporting each feature.

Themes Characterizing Child-Canine Bonding

To answer the second research question examining the prevalent themes characterizing child-canine bonding, conventional content analysis was used. Seven principal themes emerged and included: 1) *Canine Acquisition*; 2) *Bonding Strategies*; 3) *Canine Characteristics*; 4) *Canine as Family Member*; 5) *Family Profile*; 6) *Benefits*; and 7) *Other*. Each theme is presented in Table 3 along with insights gleaned from participant interviews and observational data

Discussion

Human-animal therapeutic interventions have only recently become recognized and appreciated for the beneficial effects the human-animal bond and more specifically, the child-canine bond, offers for children with ASD (Berry et al., 2013; Bystrom & Personn, 2015;

Carlisle, 2014). The findings of this study provide preliminary insights into how children with ASD and companion canines form bonds and how families impacted by ASD can integrate a companion canine into the care plan to support their children.

As outlined in Table 3, the emerging themes that appeared to influence the development of an attachment relationship include: Canine Acquisition; Bonding Strategies; Canine Characteristics; Canine as a Family Member; and Family Profile. Within these emerging themes, the ways in which families can integrate a companion canine into the care plan are also highlighted. These include, but are not limited to, making specific considerations when selecting a canine (e.g., breed, size, temperament, fit into family lifestyle, portability, durability, physical appearance), involving the child with ASD in the canine-selecting process, facilitating pre-, post-, and ongoing bonding strategies, and treating the canine as a member of the family (e.g., permitted to sleep in the child's bed, travels with the family, incorporation into daily routine, normalization of canine such that the canine is a normal part of the family's activities).

The present study offers support for the claim that children with ASD may form an attachment relationship with their companion canine, consistent with our understanding of how attachments are formed in human-to-human relationships. Given the challenges children with ASD face in establishing and maintaining relationships and the subsequent social isolation and feelings of loneliness (Ekas & Whitman, 2011; O'haire, 2013) that can arise for individuals with ASD, the present findings hold ample promise. The child-canine bonding experience evident across the families studied here mirrored the positive emotions characteristic of an attachment relationship (e.g., empathy, love, trust, joy). These positive emotions provided an opportunity for children with ASD to experience attachment outside of their immediate family which, in turn, may contribute to their learning skills that may assist in establishing peer-peer relationships.

Thus, developing a relationship with a companion canine may help children with ASD to develop a capacity to trust and care for others that may generalize to human relationships.

Furthermore, the results of this study suggest that non-trained companion canines (e.g., canines who are not specifically trained and nationally certified as autism service canines) can provide the same social benefits as those that are specifically trained to provide support for children with ASD as described in other studies (e.g., Berry, Borgi, Francia, Alleva, & Cirulli, 2013; Burrows, Adams, & Spiers, 2008; Solomon, 2010). Although social benefits elicited by companion canines for families impacted by ASD was not initially intended to be a focal point in this study, the positive social effects that the companion canines have had on the children often became a focus of discussion throughout the interview process. These included increased social interactions, communication skills development, increased ability to regulate emotions during social situations, an increase in familial social outings, and increased togetherness and cohesion of the family unit.

In addition to findings in support of the contention that the features of human-human bonding parallel those of child-canine bonding, this study also identified the strategies and characteristics used by families to facilitate the child-canine bonding process. This exploratory case study contributes to the limited human-animal bond literature examining child-canine bonding in children with ASD, merging two burgeoning yet understudied fields. Certainly, one hope of this study was that the findings would stand to inform the sharing of strategies for use by service providers and families who support children with ASD. The salient implications of this study's findings for practice, policy, and research are presented next.

The themes characterizing child-canine bonding identified in this study lend support for the contention that there are multiple benefits to having a companion canine in the family system

of the child with ASD and that these benefits extend beyond providing support to the child him or herself and extend to the larger family unit. That is, not only did children with ASD themselves profit from the integration of a companion canine into the family but there was a spillover effect that positively impacted families themselves (e.g., a reduction in the intensity of behavioral outbursts). From an applied perspective, these findings invite service providers working with children with ASD to consider supporting families by encouraging the integration of a companion canine into care plans. Additionally, the findings here inform parents seeking to informally support their children through the addition of a companion canine.

The findings also lay the foundation for future studies in the field of HAI by informing researchers about the nuanced interactions taking place within family contexts that facilitate child-canine bonding and providing insights into the benefits afforded when children with ASD form strong bonds to companion canines. Findings from this study encourage the exploration of alternative family-based interventions for families impacted by ASD that may extend beyond conventional practices. Certainly, the availability of companion canines over trained service canines makes the addition of a companion canine an accessible intervention.

This study's findings also highlight the challenges faced by families who decide to integrate a companion canine into the care plan for their child with ASD due to social policies that place restrictions on companion canines. For example, given that intentionally acquiring a companion canine for a child with ASD is a relatively new phenomenon, there are not yet policies in place to allow companion canines into settings beyond the family context. This issue was raised by multiple families in the study. Might the support offered by companion canines for children with ASD within the family context be extended to varied settings and supported by policy? For example, given the promise companion canines hold for facilitating social

interactions (McNicholas & Collis, 2000) might schools consider policies that allow the integration of companion canines into the school-based support protocols? Research in applied settings such as schools could increase awareness regarding the familial, social, and economic benefits of acquiring a companion canine for a child with ASD. Do children with ASD learn better and experience increased positive peer relations when accompanied by a companion canine?

Finally, future studies examining bonding between children with ASD and their companion canine are needed to fully understand both the underlying processes that facilitate bonding and the benefits of such a bond. Of the seven features identified here, are some features more effective in facilitating bonding? A future study might examine the efficacy of each individual feature. Additionally, a future study might examine whether the social skills evident in child-canine interactions transfer to child-child interactions. Might child-canine interactions serve as a staging or training ground for the much needed social skills often lacking in children with ASD? Lastly, to date, studies investigating child-canine bonding in children diagnosed with level-3 ASD (i.e., a more severe form of ASD) have not been identified. Might bonding look different within this population? A future study might examine child-canine bonding in children with a more severe ASD diagnosis. Do the findings presented here extend to these children?

Limitations

As with all empirical investigations, this study was not without limitations. First, as participants self-selected for inclusion in this study, the sample may not be representative of all families with children with ASD who incorporate a family canine into the care plan for their child. A second limitation lies in the scheduling of the observation of child-canine interactions

with parents determining a typical family experience representative of their child's interactions with the family canine. Repeated observations over time would have provided a more comprehensive picture of such interactions and reduced any risk of parents scheduling visits when children might be optimally compliant or receptive to an outside visitor. A third limitation concerns the context within which families were interviewed and restricts our ability to generalize findings. As families were interviewed and observed within in their home, might observations across varied contexts (e.g., at school, in the community at large) have provided a richer examination of factors influencing child-canine bonding? Despite these limitations, the findings from this study nevertheless provide preliminary insights into an understudied aspect of ASD support and set the stage for additional research shedding light on how companion canines might support children and families impacted by ASD.

Conclusion

Parents of children with ASD can face formidable challenges as they identify and integrate interventions to support the optimal development of their children. Independent of one another, the fields of HAI and ASD are burgeoning and the merging of these two fields holds promise for families seeking to support children with ASD through the addition of a companion canine to the care plan. Though the integration of a companion canine for a child with ASD is an understudied area, the findings of the present investigation offer hope for parents seeking to foster the social and emotional well-being of their children and their family unit.

Table 1

Frequency of Attachment Features Evident in Child-Canine Bonding

	PROXIMITY SEEKING	SAFE HAVEN	SECURE BASE	SEPARATION ANXIETY
1	X 11	X 3	X 2	X 2
2	X 7	X 5	X 4	X 2
3	X 3	X 3	X 4	X 0
4	X 2	X 3	X 2	X 2
5	X 7	X 2	X 0	X 4
6	X 7	X 1	X 2	X 1
COMPOSITE SCORE =	37	17	14	11

Table 2

Attachment Features and Participant Narratives

Feature of Attachment	Participant Narrative
<p><u>Proximity Maintenance</u> refers to the extent to which a child with ASD maintains proximity to the companion canine.</p>	<p><i>“He likes to keep DogThree close to him as much as possible (case 2).”</i></p> <p><i>“First thing ChildSix and ChildSeven do when we pick them up from school is seek out DogSix...They just love him (case 5)!”</i></p> <p><i>“...it went from nothing to completely inseparable (case 1).”</i></p> <p><i>“He likes to keep DogThree close to him as much as possible (case 2).”</i></p>
<p><u>Safe Haven</u> refers to the extent that the children with ASD turn to their companion canine for comfort when distressed.</p>	<p><i>“DogThree is very comforting. There is a lot more emotional regulation when DogThree is around (case 2)”</i></p> <p><i>“When he is feeling stressed he seeks comfort from them (case 1)”</i></p>

<p><u>Secure Base</u> refers to the extent that children with ASD perceive their companion canine as a dependable source of comfort and support.</p>	<p><i>“In the last year we have seen a lot more of an ability to ask and communicate needs rather than get to the point where he can’t anymore...We have noticed more of a willingness to engage in general...(case 2)”</i></p> <p><i>“I think with ChildOne, just the sense of familiarity, it makes him feel at ease in social situations. He will be calmer longer if the canines are around (case 1).”</i></p> <p><i>“...having DogFour to interact with has opened up ChildThree’s interactions and being more comfortable in social situations (case 4).”</i></p>
<p><u>Separation Anxiety</u> refers to the extent that the children with ASD miss their companion canine and become anxious when their companion canine is absent.</p>	<p><i>“...he does not handle being separated from DogThree well...he definitely gets distressed when he is away from DogThree (case 2).”</i></p> <p><i>“It is a strong bond. He would miss those canines if they were not around (case 1)”</i></p>

Table 3

Prevalent Themes, Coding Descriptions and Examples

THEMES		DESCRIPTION	EXAMPLES
CANINE ACQUISITION		Considerations made by family members when selecting a canine(s) that increase or decrease the likelihood of a strong child-canine bond	
	AGE OF CANINE	The age of the canine when introduced into the family home	Puppy versus adult canine
	PRE OR POST ASD DIAGNOSIS	Timing of decision to integrate a canine into the family	Prior to the child's/ren's ASD diagnosis or following the child's/ren's ASD diagnosis
	INTENTIONAL VERSUS OPPORTUNISTIC	Whether decisions and considerations regarding canine selection were carefully made versus flexible, open, and not driven by specific selection criteria (e.g., whether the canine was intentionally acquired or happened upon).	Specific considerations (e.g., breed, size, temperament, fit into family lifestyle, portability, durability, physical appearance) versus non-specific considerations (e.g., immediate availability at the local animal shelter, not breed bound)
BONDING STRATEGIES		Strategies that facilitated child-canine bonding	
	PRE-CANINE ACQUISITION	Strategies that facilitated child-canine bonding	Child is involved in canine acquisition process (e.g., following the breeder on social media, involved in selecting the puppy/canine, involved in naming the puppy/canine, preparing the house for the puppy's/canine's arrival)

	POST-CANINE ACQUISITION	Strategies that facilitated child-canine bonding	Canine is trained to sleep in child's bed, child is involved in training the canine/taking the canine to obedience classes, child is involved in canine husbandry (e.g., feeding, walking, grooming, and picking up after the canine), physical contact is encouraged (e.g., petting, cuddling, hugging)
	ONGOING	Strategies that facilitated child-canine bonding	Continued obedience training (e.g., ten minutes of obedience training per day at home), physical contact (e.g., petting, cuddling, hugging), playing with the canine, husbandry (e.g., feeding, walking, grooming, picking up after the canine)
CANINE CHARACTERISTICS		Behavioral and temperamental characteristics of the canine as described by the families	
	DESIRED	Characteristics contributing to a strong child-canine bond	Tolerant, reliable, gentle, patient, submissive, social, intuitive (e.g., responds to human emotions), high attachment ability (e.g., breed known for loyalty, ability to connect), affectionate, bombproof (e.g., accepting of multiple and unpredictable behaviors characteristic of a child with ASD)
	UNDESIRED	Characteristics detracting from a strong child-canine bond	Dominant, possessive, aggressive, insecure (e.g., shy, untrusting/fearful), disengaged (e.g., aloof), selective attachment (e.g., attachment geared toward a specific population such as a male adult)
CANINE AS FAMILY MEMBER		Treatment of canine as part of the family unit	Allowed on furniture, permitted to sleep in the child's bed, travels with the family, incorporation into daily routine, normalization of canine (e.g., the canine is a normal part of the family's activities)
FAMILY PROFILE		Family characteristics contributing to a strong child-canine bond	

	CHILD PREVIOUS EXPERIENCE	Child with ASD had previous experience with animals	Accustomed to having other family pets (not limited to canines) and/or being around other family pets (e.g., neighbours and/or friends pets)
	PARENTAL KNOWLEDGE AND EXPERIENCE	Prior knowledge and experience with canines	Knowledge regarding breed specific behaviours and breed characteristics, research knowledge on the therapeutic benefits canines can have on children with ASD, and previous experience with canines (e.g., growing up with canines)
	MOTIVATION	Motivation to integrate a canine into the family unit	Parental and familial desire to integrate a canine into the family home is shared, the canine is intentionally acquired for the child with ASD, the child with ASD is motivated to get a canine (e.g., persistently asking for a canine, demonstrating responsibility for canine ownership such as saving up money for a canine bed, writing out a list of things he/she will do to take care of the canine, showing attachment behaviors towards other canines)
BENEFITS		Positive influences identified from presence of canine	
	TO CHILD	Positive influences identified from presence of canine	Developmental changes (e.g., increase in maturity, capability and responsibility), emotional regulation, other regarding (e.g., demonstration of empathy and care towards animals as well as peers), increased social interactions and communication, increased patience and tolerance (e.g. sitting quietly for long periods)
	TO FAMILY UNIT	Positive influences identified from presence of canine	Increased togetherness or cohesion of the family, increased social outings and activities, decreased level of stress experienced by the family due to a reduction in emotional outbursts.

	OTHER	Miscellaneous themes not fitting in categories above	<p>Incubation period – a period during which attachment is not immediately evident but is in development.</p> <p>Bi-directional effects, children with ASD may exhibit multiple and unpredictable behaviours (e.g., stemming, squeezing, pinching, yelling). These behaviours were tolerated by the family canines which evidently had a bi-directional effect where the children tolerated canine behaviours which normally would not be accepted from another human being (e.g., a child with ASD would wipe his face after his mother kissed him on the cheek however, he happily accepted kisses from the canines).</p> <p>No competing interests - though interest was evident in interacting with canines, other more attractive activities could usurp this (e.g., tech-driven games).</p>
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Table 4

The Absence or Presence of Prevalent Themes within Individual Cases

	CANINE ACQUISITION			BONDING STRATEGIES			CANINE CHARACTERISTICS	
	Age of Canine	Pre or Post ASD Diagnosis	Intentional Versus Opportunistic	Pre-Canine	Post-Canine	Ongoing	Desired	Undesired
1	Puppy	Post	Intentional		X	X	X	
2	Puppy	Post	Intentional	X	X	X	X	
3	Adult	Pre	Opportunistic			X	X	
4	Adult	Post	Opportunistic		X		X	X
5	Puppy	Post	Intentional	X	X	X	X	X
6	Puppy	Post	Intentional	X	X	X	X	

	CANINE AS FAMILY MEMBER	FAMILY PROFILE			BENEFITS OF CANINE		OTHER
		Child prior experience	Parental knowledge & experience	Motivation	To child	To family	
1	X	X	X	X	X	X	X
2	X	X	X	X	X	X	
3	X				X	X	X
4				X	X		X
5	X	X	X	X	X	X	
6	X	X	X	X	X	X	

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