

## **Strengthening Zooeyia: Understanding the Human-Animal Bond between Veterans Living with Comorbid Substance Use and Posttraumatic Stress Disorder and their Service Dogs**

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Zooeyia includes the potential benefits that interactions and relationships with companion animals can bring to human health. These potential benefits have been grouped into four components to describe the means through which they may occur: pets as builders of social capital, agents of harm reduction, motivators for health behavior change, and active participants in treatment plans. This construct has been used to examine the human-animal bond (HAB) and understand animal-assisted interventions. It has not, however, been intentionally applied within the context of military Veterans with posttraumatic stress disorder and comorbid substance use paired with Service Dogs (SD). A qualitative approach to analysis using zooeyia was applied to data collected during an exploratory patient-oriented, time-series research design with Veterans teamed with SDs through a national holistic Canadian training program. All four components of zooeyia were present in the experiences of Veterans with SDs; SDs were builders of social capital, agents of harm reduction, motivators for health behavior change, and active participants in treatment plans. While Veterans working with SDs reported many benefits, the pairs also experienced specific complex challenges, beyond the expected concerns for a household pet. The human-animal relationship between Veterans in this study and their SDs, and the subsequent growing bond, is a key contributing component and step to the strengthening of zooeyia. This analysis of zooeyia extends our understanding of how SDs support veterans' health, including better management of PTSD and problematic substance use. Because the HAB is reciprocal, this analysis also challenges One Health to recognize and embrace concerns for animal welfare.

*Keywords:* zooeyia, PTSD, Veterans, service dogs, human-animal bond

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The Human-Animal Bond (HAB) has been defined as “the dynamic relationship between people and animals such that each influences the psychological and physiological state of the other” (College of Veterinary Medicine, Purdue University, n.d.). The American Veterinary Medical Association (2020) extends this definition by adding that this relationship “is influenced by behaviors that are essential to the health and well-being of both. This includes emotional, psychological, and physical interactions of people, animals, and the environment”. The concept of the HAB is often used to frame discussions about human-animal relationships. For humans, successful relationships, in general, greatly depend on the development of a bond or attachment (Mena et al., 2019). Highlighting evidence of the importance of animals in the lives of humans, most people recognize their pets, or companion animals<sup>1</sup>, as family members (Risley-Curtiss et al., 2011; Volsche, 2019). The success of an Animal-Assisted Intervention (AAI) is also highly dependent on the relationship between humans and animals (Mena et al., 2019), and the HAB is key to explaining how AAI operates (Chalmers et al., 2020).

Relating to the HAB is the construct zooeyia, which highlights multiple potential benefits that interactions and relationships with companion animals can bring to human health (Hodgson & Darling, 2011, p. 189; Chalmers et al., 2020). Zooeyia has been used to examine the impact of human-animal bonds (Hodgson & Darling, 2011, p. 190), with an emphasis on human health (Hodgson et al., 2015). It also extends the One Health focus on zoonosis (disease transmission from animals to humans), and its recognition of the human, animal and environment interface (Centers for Disease Control and Prevention, n.d.). Outlined within zooeyia are four benefits to human health that companion animals can foster: building social capital (e.g., reducing loneliness, facilitating social contact, increasing civic engagement); harm reduction<sup>2</sup> (e.g., reducing substance use that could harm pets, such as smoking in the home); motivating healthy behavior change (e.g., increasing physical activity, developing healthy eating patterns); and, actively participating in treatment plans (e.g., perceived non-judgmental social support, reducing stress) (Hodgson et al., 2015). While the HAB implies that a relationship is positive and reciprocal, zooeyia considers some potential risks or challenges to companion animal ownership and is more one-sided with a focus on the outcomes for humans (Hodgson et al., 2015).

Hodgson et al. (2015) support the inclusion of companion animals into human treatment plans as a means for capitalizing “on resources already in place” (p. 529), and AAIs have been described as potentially “zooeyia in practice” (Chalmers et al., 2020, p. 6). AAIs are described as “goal-oriented and structured interventions that intentionally include or incorporate animals in health, education, and human services” (IAHAIO, 2018) for the purpose of “therapeutic gains in humans” (Glenk, 2017; IAHAIO, 2018). Dogs are one of the most incorporated animals into AAIs (Bell, 2013; Dell et al., 2015; Havey et al., 2014) as they are readily available, trainable, predictable, adaptable, flexible, and sensitive to the diverse needs of individuals in varying contexts (Mills & Hall, 2014; Glenk, 2017). Furthermore, the long history of domestication of dogs seems to have contributed to their ability to comprehend human social and communicative behaviour (Hare & Tomasello, 2005) and develop relationships and strong emotional bonds with humans (Wynne, 2019). As such, the human-dog relationship has been likened to adult pair bonds

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<sup>1</sup> The term pet is used in this article for ease of terminology, but with the recognition that companion animal is the preferred term to recognize the relationship people have with animals with which they share their lives.

<sup>2</sup> Traditionally, harm reduction refers to “policies, programmes and practices that aim to reduce harms associated with the use of psychoactive drugs in people unable or unwilling to stop” (Bonomo & Bowes, 2001; IHRA, 2009). The term has been expanded and applied into various social realms beyond substance use, such as the field of sexual health (Canadian Paediatric Society, 2018). A more recent, encompassing definition of harm reduction describes it as “a strategy directed toward individuals or groups that aims to reduce the harms associated with certain behaviours (Canadian Paediatric Society, 2018).

or friendships (Mena et al., 2019). Zooeyia has been considered as a means for understanding how and why AAIs work (e.g., Chalmers & Dell, 2015; Dell et al., 2018; Dell et al., 2019; Chalmers et al., 2020) and one way to account for the HAB with visiting therapy dogs.<sup>3</sup>

While Assistance Animals are not considered a form of an AAI because of the purpose/type of work they perform and their legal designation (IAHAIO, 2018), they can serve as an example of the human-animal relationship and bond. Assistance Animals are trained to perform specific tasks for people with physical, sensory, psychiatric, intellectual or other mental disability, including posttraumatic stress disorder (PTSD) (Americans with Disabilities Act, 2010; LaFollette et al., 2019). Types of Assistance Animals include Guide Dogs for the visually impaired, Hearing dogs for the hard of hearing or deaf, and Services Dogs (SD) for all other disabilities (e.g., seizure alert, wheelchair, psychiatric conditions) (Assistance Dogs International, 2021). In Canada, there is currently no nationally recognized certification program for any type of SD, and legislation regarding public access of SD teams varies between provinces and territories (CFAASS, 2020). Obtaining a SD through a registered charity or non-profit organization is typically considered the most reliable options as these groups are accountable to provincial/territorial regulators to adhere to their mandate (CFAASS, 2020). In cases where an individual acquires a pre-trained SD (compared to training them with support from SD organizations), pricing can range from \$3,000 to \$50,000 CDN (CFAASS, 2020).

Increasingly, Veterans are seeking the support of SDs to manage physical and psychological conditions, such as PTSD (VAC, 2019). The American Psychiatric Association (2013) defines PTSD as a “psychological response to the experience of intense traumatic events, particularly ones that are life threatening.” In Canada, approximately 15,000 war-service Veterans and peacekeeping members have been diagnosed with PTSD (Rebeira et al., 2017). Within a military context, potentially psychologically traumatic events (PPTe), include instances of direct combat and experiences in war zones (Carleton et al., 2020). Moreover, PPTes which occurred before or after a Veteran’s service (e.g., violent crime victimization, motor vehicle accidents, natural disasters), may compound with military PPTes to increase the risk for PTSD (Carleton et al., 2020). Individuals with PTSD are at increased risk for experiencing suicidal behaviour (Sareen et al., 2007), developing other psychiatric disorders (e.g., anxiety disorders, depressive disorders) (American Psychiatric Association, 2013), experiencing diminished physical health (Asmundson, et al., 2002), and are susceptible to a variety of general medical conditions (Sareen, et al., 2005).

The literature indicates that a diagnosis of PTSD particularly increases the risk for developing a substance use disorder (SUD) (Bowe & Rosenhack, 2015; Banducci et al., 2016), as symptoms are likely to be alleviated through prescription medications, such as opioids, as well as the use of other licit (e.g., alcohol) and illicit (e.g., cocaine) substances (Butler & Taylor, 2015; Harnish et al., 2016). A report by Veterans Affairs Canada (2017b) suggests that among Veterans with PTSD, more than 50% of males and more than 25% of females problematically use alcohol and drugs. Some evidence also suggests that male Veterans are more likely than their female counterparts to have a comorbid diagnosis of PTSD and substance use disorder (Cribbs, 2017). Generally, however, there is an absence of research attention to substance use amongst serving and Veteran military members (Williamson et al., 2021), as well as stigma associated with problematic use as some substances are a part of military culture (e.g., alcohol use) (Jones & Fear,

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<sup>3</sup> Therapy dogs “provide psychological or physiological therapy to individuals other than their handlers...Typically, they visit hospitals, schools, hospices, nursing homes, and more. Unlike service dogs, therapy dogs are encouraged to interact with a variety of people while they are on-duty including petting the therapy dog” (<https://www.therapydogs.com/service-dog-vs-therapy-dog/>).

2011; Neighbors et al., 2014). Stigma is also a documented barrier to accessing health care, including for substance use (Public Health Agency of Canada, 2019; Williamson, 2012).

As treatment for comorbid mental illness is complex, the best practices for treatment continue to evolve (McCauley et al., 2013; Nass et al., 2019). Veteran engagement with SDs is considered an innovative approach to managing PTSD symptoms and SUD (Williamson et al., 2021). Veterans working with specially trained SDs (often referred to as psychiatric SDs) as a complementary treatment for PTSD, for example, have reported increased calmness, more positive affect, and lower feelings of hyperarousal, anxiety, and hypervigilance (Rodriguez et al., 2020). Moreover, several benefits have been documented for Veterans with regards to managing their PTSD and co-morbid substance use disorders, as well as their overall physical and mental health (Yarborough et al., 2017; O’Haire & Rodriguez, 2018; Vincent et al., 2018; LaFolette et al., 2019; Whitworth et al., 2019). This includes improvements in PTSD symptoms, increased social interactions and improvements in interpersonal relationships (Foreman & Crosson, 2012; Winkle, et al., 2012; Miller, 2014; Crowe et al., 2017; O’Haire & Rodriguez, 2018; Vincent et al., 2019), increased ability to bond and trust (Taylor, et al., 2013), reduced social isolation (Foreman & Crosson, 2012; Crowe et al., 2017), reduced depression and stress levels (Yount et al., 2012; Crowe et al., 2017; Yarborough et al., 2017; O’Haire & Rodriguez, 2018; Vincent et al., 2019), decreased loneliness (Matuszek, 2010; Stern et al., 2013; Yount et al., 2013), reduced physical challenges, improved performance of functional tasks (Crowe et al., 2014), improvements in emotional states and emotional health (Taylor et al., 2013), and improved overall quality of life and well-being (Yarborough et al., 2017; O’Haire & Rodriguez, 2018). Albeit limited, there is evidence that Veterans working with SDs also decreased their problematic use of prescribed and other licit and illicit substances (Husband et al., 2020; Williamson et al., 2021).

While Veterans are foremost matched with SDs for their technical skills (e.g., wake from a nightmare), the impact of the human-animal bond is minimally recognized for its role in the Veteran-SD relationship. Further, zooeyia has not been intentionally applied within the context of Canadian military Veterans with PTSD and comorbid substance use paired with SDs. Given that the HAB is a fundamental element of the relationship between a Veteran and their SD, and that SDs share similarities to companion animals (e.g., live full-time with the Veterans) as opposed to AAIs such as therapy dogs that periodically interact with individuals, zooeyia may serve as a helpful model for understanding the human-animal relationship. As such, the purpose of the current research was to conduct a content analysis using the zooeyia framework to identify potential benefits and associated challenges SDs bring to the lives of Canadian military Veterans with PTSD and comorbid substance use.

### **Methods**

An exploratory patient-oriented, longitudinal research design was used to allow for Veteran engagement at all levels of the project and measurement at multiple time points. The research team partnered with AUDEAMUS, Inc., a national holistic, not-for-profit SD training program for Canadian military Veterans with physical and operational stress injuries (OSIs), such as PTSD. AUDEAMUS, Inc. facilitates hands-on training for Veterans with dogs provided at no cost to the Veteran and matched by the program, or with Veterans’ own approved companion dogs.. Veterans determine their personal SD training schedule and timeline. The AUDEAMUS, Inc. model (Table 1) requires that the Veterans learn to train their own SD as means for: 1) increasing the level of investment in the training program and, 2) increasing the HAB between the Veteran and SD, which can improve training outcomes. The AUDEAMUS, Inc. SD program was chosen for this study partially because of ready access as well as for their two-part focus on technical skills and the

human-animal bond. It should be noted that AUDEAMUS, Inc. provides SD training with understanding about the Veterans’ needs for other life skill support because of their OSI (e.g., isolation), and is guided by the needs of the individual Veterans tasked with independently training their SD.

**Table 1. AUDEAMUS, Inc. 7-stage process**

<b>Stage 1</b>	Consultation with a Veteran’s health care practitioner to complete the medical referral form.
<b>Stage 2</b>	Completion of program administrative requirements alongside the program application form. Health care practitioners are provided with information about Service Dogs, how they can assist persons with impairments, where Service Dogs fit into a medical treatment plan, and what the Veteran’s responsibilities will be.
<b>Stage 3</b>	Consultation with a AUDEAUMUS, Inc. trainer to discuss pairing with a Service Dog. Topics include: costs that are covered by the program; canine care and the responsibility of the Veteran in the program; training options, levels, certification, and recertification; aftercare contacts (French and/or English); criteria for a dog that a Veteran may bring into the program; insurance, both liability and pet health; media and public relations responsibilities (if agreeable), including privacy; difficulties encountered in training; and, what users can do if they are denied access to training or full certification, and the legal support AUDEAUMUS, Inc. can offer.
<b>Stage 4</b>	Veterans are taught the techniques they require to train their Service Dogs under AUDEAUMUS, Inc.’s unique holistic training curriculum.
<b>Stage 5</b>	Users are part of a 52-week Service Dog progression period mentored by AUDEAUMUS, Inc. trainers. Trainers assist Veteran/Service Dog teams with learning basic obedience skills using positive reinforcement, emphasizing engaging/connecting as a team. This often begins with a several day training retreat. Trainers also assist teams with preparing for public access, as well as understanding the importance of emotional regulation and recovery for safety and security in all situations. Service Dogs are also taught more specific skills to meet their Veteran’s physical and mental health needs.
<b>Stage 6</b>	End-users are certified for a period of 3-years, including aftercare and follow-up.
<b>Stage 7</b>	End users are re-assessed annually by AUDEAUMUS, Inc. in partnership with the Veteran’s mental health practitioner and the Service Dog/Veteran team are re-certified every three years.

*Note.* Table was created with information from AUDEAMUS, Inc. website and during consultation with program operators. Each Veteran has a unique experience with training, and it fluctuates between accomplishments and challenges. Timelines are not imposed on Veterans, but instead are guided by the Veteran given their unique and changing needs. At the time of data collection, all of the Veterans were at various points of Stage 5. Training retreats are common to the program and occur when space and travel funds are available beginning around Stages 4 or 5. They vary in length and participation. Weekly training is also a part of the program, dependent on participants living in the same vicinity.

## Participants

The data was collected over the course of 1 year, based on a sample of five male Veterans<sup>4</sup> diagnosed with PTSD by a mental health professional before the time of study participation. The mean age of this group was 43 years (ages ranged from 36 to 51 years). Two participants identified as Caucasian, two as Métis, and one as First Nations. Most ( $n = 4$ ) were married and had children, and one was in a romantic relationship until 3 months into the data collection period. All Veterans had at least some post-secondary education.

<sup>4</sup> The term ‘Veteran’ is used in lieu of ‘participant’ out of respect for the Veterans and the patient-oriented approach of the research.

Three Veterans were matched with dogs, and two trained their own companion dog as a SD. Two of the dogs that were matched were under 24 months larger mixed breeds from a shelter (1 male and 1 female), and the third was a female Portuguese Waterdog puppy (6 months) the Veteran purchased from a breeder to address allergy sensitivities. One of the family dogs was a small, young (1 year) male mixed-breed and the other was a young (18 months), female border collie. At the 6-month time point, one Veteran retired his male mixed-breed due to training limitations; the dog was subsequently kept as a companion animal and replaced by a young (1 year), large mixed-breed male from a private vendor. Additionally, during the same time period, another Veteran requested and switched to training a female dog for personal reasons, which was a young (1 year) “shepherd mix.” The male dog that was switched out was matched with another Veteran entering AUDEAMUS, Inc. .

### **Procedure**

The research was approved by both the Human and Animal Research Ethics Boards at the University of Saskatchewan [BEH 17-371; AUP 20170114]. Participants were recruited through AUDEAMUS, Inc. by starting at the top of their waiting list and ensuring Veterans met the research requirements (e.g., had a formal PTSD diagnosis and problematic substance use). Veterans who met the criteria were invited to participate and connect with the lead researchers (Dell and Chalmers). Informed consent was obtained in-person by the lead researchers, as indicated by a signature for each participant on the consent forms. Participants provided their informed consent throughout the data collection process. Consent forms were stored separately from the data to ensure that participant identity would not be connected to their responses.

Data was collected through semi-structured interviews across 6 periods corresponding with training retreats (as noted in Table 1) from May 2018-2019 at the following time points during the first year of the AUDEAMUS, Inc. program: baseline (on day 2 of the first 5-day training retreat), 1 month, 3 months, 6 months, 9 months, and 12 months. Five of these sessions were held in-person, and one period was completed by telephone due to inclement weather-imposed travel restrictions. At each interview, Veterans were asked the following: i) to describe their relationship with their SD; ii) if they felt connected to their SD, and how they would describe this connection; iii) how much time they spend with their SD, and if this has changed over time; iv) whether their SD has affected their quality of life; v) how often they are getting out of the house, and whether their SD accompanies them; vi) how their SD has improved their physical, social, spiritual, and psychological health; and vii) if any of these experiences with their SD has affected their PTSD symptoms. These questions were asked nearly verbatim, however follow-up questions were not and depended on the information shared, although it remained specific to the focus on the question. Interview duration ranged from 30-75 minutes, averaging 60 minutes, and were conducted by two of the primary researchers – one, a social worker, and the other, an addictions specialist, both with extensive qualitative interviewing experience (over 20 years each). Interview transcripts were provided by a neutral individual, not affiliated with the research team, and then verified for accuracy by the first author. For the purposes of reliability, two members of the research team (Williamson and Cruz) independently conducted deductive analysis using Saldaña’s (2013) content analysis coding guide (hypothesis coding during the first cycle of coding and a mix of elaborative, top-down and longitudinal coding in the second coding cycle) and drew on the zooeyia theoretical framework (Table 2) to expand the conceptual model (Miles & Huberman, 1994). Codes were organized collaboratively by the first and fourth author according to the zooeyia categories as well as contradictions/additions to each category (i.e., challenges as opposed to benefits), then discussed and finalized after review by all authors.

**Table 2. Benefits of human-animal relationship outlined by the zooeyia framework (recreated from Hodgson et al., 2015)**

Subcomponent	
<b>Builders of social capital</b>	<i>“Pets have a ripple effect on social interactions, reduce loneliness, they are steadfast companions, facilitate social contact, encourage give and take among neighbours that builds a sense of community, pet owners more civically engaged than non-pet owners.”</i>
<b>Agents of harm reduction</b>	<i>“Patients who engage in high-risk behavior can be adamantly unwilling to harm their pets, secondhand smoke can harm pets so this can encourage people to quit or smoke outside the home.”</i>
<b>Motivators for healthy behavior change</b>	<i>“Pets can motivate positive and healthy behavior change...dogs are consistent and enthusiastic proponents of physical activity. Pets can encourage regular eating patterns and stimulate activities of daily living.”</i>
<b>Active participants in treatment plans</b>	<i>“Many controllable health risk factors can be positively affected by having pets including physical inactivity, obesity, smoking, hypertension, and social isolation of chronic disease and psychiatric disease. Pets provide non-judgmental social support that buffers pathogenic responses to stress.”</i>

## Results

All four components of zooeyia were evident in the experiences of Veterans with SDs. While numerous benefits of working with a SD were reported, the Veterans also cited drawbacks – some that reflected common challenges with companion animals, and others that appeared to be more SD-specific. As the bond with the SD developed during the training program many of these challenges, as expected, diminished or were mitigated.

### SDs as Builders of Social Capital

Three subthemes of the *“SDs as builders of social capital”* component of zooeyia were identified: impact and challenges on the Veterans, impact and challenges on relations with family, and impact and challenges interacting with and being in community.

#### *Impact on the Veterans*

***Reducing loneliness, relationship formation, and bond development.*** Primarily, the SDs helped reduce loneliness and provided companionship for the Veterans. Each Veteran described feeling a sense of belonging, having a strong connection with their SD, being part of a *“pack”*, and having a pet owner identity. The Veterans perceived their SDs as caring about them, understanding them, giving hugs, comforting, making them laugh, making them happy, aiding in recovery, and having their back. Some Veterans used words such as *“friends”*, *“companions”*, and *“battle buddies”* to describe their SD. Some individuals even described their SD as being a different kind of caregiver compared to their spouse.

For some Veterans, the relationship with their SD was described as reciprocal, since the SD also looked to them for comfort and support. One Veteran described the relationship with their SD as *“opening the door to recovery”*. Another described not perceiving dogs as companions before working with their current SD. This Veteran reported loving their SD more daily, getting in tune with them, and having found it easier to play with them over time.

If I compare with the beginning [dog] she was really, really independent at the beginning; I have had [dog] for the last five months and have been working in the last few months to create a good connection with her so it was my principal

homework at home and it is creating a relationship with [dog] and I so we have better interaction and if I compare with the beginning the relationship is completely different (Veteran 5, 3 months).

There was also evidence of relationship development and bond formation between the Veterans and SDs. Towards the start of the year, three of the Veterans who were matched with SDs described how their relationships and bonds were slowly developing. A couple of Veterans reported developing strong bonds with their SDs relatively quickly (e.g., 1 month), while for others it took anywhere from a few months to close to a year for them to feel connected and describe the bond as strong. All of the Veterans reported that they spent the majority of their time each day with their SD. Exceptions to this were when some of the Veterans travelled outside the country or navigated public spaces early on in the program with a SD who was still in the early introduction to training.

Veterans who transitioned their family pet into training for a SD role also described distinct relationship trajectories. One Veteran reported having a strong initial bond to their pet-turned-SD, but this relationship was strained when the dog began to exhibit anxious-tendencies that made training challenging. As the Veteran's physical health deteriorated over the course of the year due to a prior condition, it became apparent that the SD was not suitable; the Veteran required a bigger, stronger dog that could assist with mobility issues. As such, AUDEAMUS, Inc. assigned the Veteran a new SD and the first SD was "*retired*" and continued as a full-time family pet. The second Veteran with a pet-turned-SD developed an extremely strong bond. He described his SD as his "*everything*" and "*spark*". He also reported at one point he did not care about other people as much with his SD in his life because she offered everything he needed.

Well, we are, we are truly a team right. I couldn't imagine life without her, I really couldn't. I don't know how I would function, I know how I functioned as long as I did I didn't do nothing and I would die but I couldn't imagine being without her and I mean the purpose of a service dog is to teach you that you can accomplish these things whether or not you doing them with your dog but it is that you know you can do it and she has made me grow up and she has brought me along and I have brought her along for the ride to show me that I can do stuff, I don't have to be scared of everything but I can't imagine doing this without her (Veteran 4, 9 months)

### ***Challenges for the Veterans***

Despite the many relational benefits, there were also times when the Veterans were frustrated with the expectation and responsibility to be with their SD full-time and take them everywhere. These expectations were particularly difficult to manage if a Veteran had not yet acquired the SD-in-training vest and training card for their dog, legitimizing their SD role, or if they were not confident that their SD was trained well enough to take them outside of their home. Some Veterans desired time away from their SD, especially when socializing with friends. Others hoped that they would not have to be fully dependent on their SD at the current time and in the future. Veterans also noted that training and meeting the daily needs of a SD required a lot of work.

Bond development with the SD was challenging for some Veterans as it often took longer than anticipated for them to feel connected to and build a secure and trusting relationship with their SD. Throughout the year, one of these Veterans described having a "push-pull" relationship with their SD where he knew there were mutual benefits to the relationship, but still found himself pushing his dog away. Another Veteran struggled to accept his male SD due to personal reasons and ultimately requested a new female SD around the third month of data collection, effectively

severing the former relationship. Not long after receiving his new dog, this Veteran reported grieving over his relinquished SD. A third Veteran described having an increasingly strong bond with their matched SD. However, he indicated that he did not intend to have his SD forever. Subsequently, this Veteran turned over his SD he purchased to train to [program] at the end of the year.

Additionally, finding the right type or breed of dog was of importance for many of the Veterans. An example of desired SD characteristics expressed by the Veterans included being large enough to handle the physical weight of the Veteran. Some Veterans also discussed concerns related to monetary and emotional costs of having an SD. Monetary costs included food, other necessities, and veterinary bills.

It is a financial burden there is no doubt about it. It is expensive, absolutely it is but is it worth the cost of putting it out to have the best dog I can have and have her a part of my life, it is but I am also very, very fortunately that I am financially stable so somebody that doesn't have the financial support it may be very, very overwhelming on them and then you are going risk over reward do I spend that \$1,000 to buy the dog, \$300.00 to get it fix, \$100.00 a good bag of food, \$500.00 for training every six months I can't afford either my kid is going to do without food or maybe the kids going to do without hockey so I can have this dog so what are you are going to put first so I am open to your kid (Veteran 4, baseline).

Some of the emotional costs mentioned were managing health issues and general well-being. Veterans also spoke of an unfortunate reality that their SD has a relatively short lifespan (e.g., on average 10 years). As such, Veterans were saddened by the thought of their SD passing one day.

### ***Impact on Relations with Family***

Veterans offered little insight into the potential benefits their SDs may bring for their familial relationships. However, some Veterans did say they were hopeful that the SDs would help them connect and speak with individuals (e.g., spouses) about their experiences with PTSD.

### ***Challenges for Relations with Family***

Compared to benefits, the Veterans said a lot more about the challenges their SDs posed for their families. In various ways, the Veterans reported issues regarding acceptance of the SDs from some of their family members. For example, some family members had allergies to dogs or held differing ideas about the role of dogs (e.g., dogs should work outside or on farms as opposed to living as indoor pets). For Veterans who already had family pets (dogs, cats), bringing a SD into their home was not always a smooth transition.

The black cat doesn't seem to want anything to do with her and she did go and take a run at seeing who is dominate like sneaking up with her tail and guaranteed if she flinched my cat would have batted her, but she didn't and she just sat there, had a serious look on her friends like "we can be friends or we can do this, it's your call" and then the white cat is trying, comes around but hisses and stuff like that and actually last night I bought her a bone with the filling in it and she ate the filling out and so the cat was eating the bone so she got down to see what was going on and my house is all hardwood floors and so the cat just bolted behind the TV, ripped all my cords out of all of my electronics and ran down the hall and you could just see [makes noise of wires

sizzling] but I think they are going to be the best of buds those two once they figure it out (Veteran 1, baseline)

One Veteran reported that at times his SD also did not get along with his other dogs, which put a lot of strain on the household.

After [SD] snapped and bit the one dog [spouse] didn't trust him: 'I don't want him in the house; you get him out of here.' So, my wheels were turning, and I was getting really bonded with him and it was okay now I am going to have to get rid of him because there is this trust issue. (Veteran 3, 1 month)

Some of the Veterans also reported struggles with their significant others' acceptance of the SD in their life. One Veteran reported that his spouse felt as if she was less important compared to his SD, while another Veteran reported an instance where he chose to spend time with their SD rather than significant other:

Yes sure [dog] is the only one I want to be with. Actually I had a fight with the wife over it, well not really a fight, but she had an office day and texted me and said "you know I have had a long week and am exhausted what if you and [son] come up and we will go for supper" and I said "oh I can't" and she texted back "why not", "oh me and [dog] have got plans" and I never heard anything for about 20 minutes and she said "okay" and left it at that and she didn't start a fight. When she got home the next day she said "explain to me how you and [dog] had plans" and I said "well [dog] and I just went to play fetch" and she said "so [dog] got up and texted you and was going to meet you at the ballfield so explain to me why you couldn't have come up for supper and then you and [son] could have played fetch with [dog], it is not like you had to leave [dog] home by herself" and I was just like whatever and the point she was getting at (Veteran 4, 1 month)

### ***Impact on Community Interactions***

The third subcomponent relates to instances when the SDs aided the Veterans in social situations. Some felt safer and more comfortable engaging in public spaces while other Veterans thought that the SD diverted unwanted attention away from them. The Veterans also reported that being part of a group, developing connections, and having a sense of belonging were benefits related to working with the AUDEAMUS, Inc. program. Some of the Veterans felt an allegiance and sense of camaraderie with other Veterans in the program, which they believe they would not have without their SD and AUDEAMUS, Inc. .

Having people to meet up with and positive people to meet up with too; you get a bunch of sick people together without someone there to positively direct can get a little negative. I don't know that is why it works so well between me, [program member] and [program trainer] nobody was negative towards anything like if we had a bad day, someone bitched about it and then we laughed about it and then we carried on talked about the dogs and stuff there was none of this "oh I can't do it" like feeding into that there was none of that, there was no negative talk about other people, there was no negative talk about AUDEAMUS, Inc. or anything it was just people getting better the way they were supposed to and it was amazing (Veteran 1, 3 months).

### ***Challenges to Being in Community***

Despite having increased social connections, some of the Veterans reported challenges engaging with people in public. For example, Veterans felt hyper vigilant in public spaces as a symptom of their PTSD and some found it difficult to trust non-military personnel. Others discussed issues with both self-imposed and perceived stigma. Because the SD brings attention while in public, the Veterans often had to face personal fears of being judged by people or answer questions related to their injuries or mental health. Additional reported challenges included navigating airports with their SD and managing the fact that their SD does not necessarily get along with other dogs, which limits the ability to socialize with other dog owners. Veterans also described their SD as a “*pill*” or “*addiction*”, and some used their SD as a “*scapegoat*” or excuse to not spend time with others.

I was starting to get into a habit of using her that when somebody would call me and ask me to go for a coffee I would say, ‘no I can’t sorry I have got plans’, meanwhile the plan was to take the dog for a walk so for a while I did hide behind her and it actually was 100% opposite of what she was supposed to do. She kept me from going places, she didn’t keep me from places. I kept myself from going places and used her as an excuse but thankfully the wife sorted me out very quick (Veteran 4, 3 months).

### **SDs as Agents of Harm Reduction**

There were reported instances when the SDs acted as “*agents of harm reduction*” for the Veterans, particularly with respect to their substance use. Each Veteran reported decreases in their substance use which they attributed to their SDs. One Veteran recognized how their SD brought a sense of calm into their life and helped decrease the intensity of substance use cravings. During times of anxiety and increased substance cravings, the SD reportedly barked at the Veteran and seemed to want to play more.

**Interviewer:** So, does that [substance use craving] still continue now?

**Veteran:** Not since I got her because now when I start shaking because even four years later I start shaking and so all winter especially with her she reads me so good if I start craving it she gets me out of it, she goes and does something stupid, she goes and gets a ball, goes and gets her bone and I won’t take her to the places I used to have to go to get it so my craving occurrence is about the same but the intensity is less and I don’t think I will ever beat it, I really don’t. I am winning but the battle will never end. It is not a set battle like we won the war let’s go home; it is always going to be a war because I am winning the battle (Veteran 4, baseline)

This Veteran later reported a decrease in their reliance on medical cannabis as a sleep aid since matched with their SD who is trained to interrupt during nightmares. The Veteran also reported the belief that if an individual is serious about working with and caring for a SD, then they need to give up substances like opioids and alcohol to have a clear headspace.

The person you bring it into the program definitely has to be either a very, very committed to giving up opioids or they have to be clean from opioids for a little bit first because I couldn’t care for my 12, 10, 9 year old child when I was high, you are not going to care for a dog (Veteran 4, baseline)

Caring for and training a SD while intoxicated was perceived as challenging, especially while drunk, high, or hungover.

When I first got diagnosed with PTSD I was taking 17 pills a day so I wouldn't kill myself and then I got [dog] and I went to 2 grams of marijuana a day and right now I am lucky if I use 2 grams of marijuana a month and no drinking. I drink like on a Friday night if I am barbecuing I might have a glass of wine or something but I don't know the last time I was drunk but no illegal products, very little marijuana, very little alcohol, well you can't train with her properly if you are drunk and you can't train properly in the morning if you are hung over (Veteran 4, 3 months)

### ***Non-substance Use related Harm Reduction Instances***

Another harm reduction strategy reported by the Veterans was having their SDs with them while driving and specifically to help decrease road rage. One Veteran indicated that they were more confident in driving on busier roads and were less likely to react negatively toward other drivers if their SD was in the car. A second Veteran noted that being able to pet their SD's fur helped them become more mindful or present and feel more comfortable while driving. This individual also reported that talking to their SD while driving helped to keep them grounded.

**Veteran:** Yes and I mean I avoid driving on main roads with lots of traffic at rush hour times like I go out of my way I will drive down 30 zones doesn't matter it is driving slow, it is a more controlled environment but yes with [dog] I actually find myself being able to drive on the more major arteries.

**Interviewer:** And is that because you are trying to keep him safe?

**Veteran:** Yes because I mean honestly I don't give a crap if I die in a fiery car wreck as long as I get the bastard that cut me off but if he is there I can't hurt a dog (Veteran 2, 3 months).

### ***Substance Use-related Challenges***

Despite some Veterans reporting decreases in substance use while working with their SDs, one Veteran reported that they smoked cigarettes more frequently because they were going outside with their SD often. Further, the Veteran who struggled with their male SD indicated that the stress from this situation led to an increase in drinking and overeating at the time.

**Veteran:** Alcohol is still there sometimes. When I get stressed, I am opening up the cabinet. I had a couple of drinks the last month because of what was going on; I was starting to really stress so I had a couple of drinks.

**Interviewer:** In excess at times like over five?

**Veteran:** I think those two nights I was probably over five.

**Interviewer:** What about food because I know we talked about emotionally you tend to eat?

**Veteran:** Oh yes that is still there.

**Interviewer:** And did you turn to that more over the last month?

**Veteran:** Oh yes chips, cheezies, more chips, oh cookies I will have cookies but you could see the apples and bananas and it is like no I need something salty so you gravitate to those. (Veteran 3, 1 month)

### ***SDs as Motivators for Healthy Behavior Change***

#### ***Physical Activity Benefits***

Overall, the SDs were instrumental as “*motivators for healthy behavior change*”, primarily by increasing the Veterans' physical activity levels. Each Veteran reported throughout the year that their SD helped to keep them physically fit and got them exercising more due to the dog's

need for daily walks, play activities (e.g., fetching a ball, chasing in the yard), and training. Some Veterans reported taking their SD with them to the gym, but this seemed more common among individuals with dogs who were further along in their training. Because the Veterans lived in Canada, time spent outside was seasonally dependent; they were more sedentary and stayed indoors more during the winter months.

I haven't walked in 20 years maybe longer unless it was a forced march with the military and even then, I didn't. When I started gaining weight from my trauma I was quietly sliding around the physical fitness side, get medical shit here and there saying okay he doesn't have to do it, he has got sore knees or sore back and stuff. So, when I started walking with him it was like wow, he is such a gentle walker I just kept walking and then walking some more and then walking some more (Veteran 3, baseline).

I go out of the house more; I take a walk two times a day and if I can three times and here, I never walked like I walk here with the dog. When I have the chance, I go and take a walk and there are some nice places to walk (Veteran 5, baseline).

### ***Additional Health-related Benefits***

In addition to increased physical activity, other health changes reported by the Veterans that they attributed to working with the SDs included personal weight loss, healthier eating (e.g., cooking at home), less boredom, improved emotional regulation, improved hygiene (e.g., showering daily), uptake of a meditation practice, decreased caffeine consumption, and increased engagement with hobbies. Veteran 2 at time 2 stated "I have been cooking more meals at home and buying less pizza and that sort of thing.... because I have been able to think of it" (Veteran 2, Time 2).

I am more active so at the beginning in my woodshop I was just working maximum two hours or 2 ½ and now I am able to stay for five or six hours in my shop and stand up. I bought carpet you know for my back and so each station has the special carpet but anyway I had it at the beginning and was not able to do more than two or three hours maximum and now it is around five hours average and one time a few weeks ago I did 10 or 12 kilometers walking...with [dog] so I do walk every day well practically every day (Veteran 5, 12 months)

### ***Physical Activity Challenges***

For the Veterans with severe injuries (e.g., back, knee), increased physical activity put them at risk for physical pain, so they recognized the need to be careful and take it slow. There were also some SDs who experienced injuries while partnered with their Veteran, which decreased the activity level for both them and the Veterans.

I have been hiding in the house and not really doing much and then with [dog's] physical problem with his leg I am paranoid about taking him out and hurting him. I can't even take him for a walk around the block like last night throwing the ball and stuff in the backyard he was playing, and he is still playing and having fun but he hunkered in a couple of times while he was running because his leg just gave out so I am kind of paranoid about taking him out and playing much because if I need to go somewhere I can take him but then at the same time I don't take him with me places because he is scared of stuff and most of the stuff I have to do is during the day and during the day

when you are going to run into lots of people so it is all very self-defeating stuff so we just go (Veteran 2, 3 months)

### **SDs as Active Participants in Treatment Plans**

The SDs were reportedly “*active participants in treatment plans*” and instrumental in helping the Veterans manage a variety of PTSD and related symptoms, including decreasing anxiety, depression, suicidal ideation, stress responses, isolation, and pessimistic thoughts. Each of the Veterans reported three main ways their SDs affected these symptoms: through the intimate bond they formed, providing a sense of purpose, and specific skills the dog was trained to perform. Veterans also reported that they felt the dogs loved them unconditionally, were non-judgmental, provided comfort, helped them stick up for themselves, made them feel not alone, offered a complement to other psychological treatments, and were loyal, constant, and reliable. Most Veterans reported having fun playing with their SDs and feeling less bored with them around. One Veteran indicated that with their SD by their side they did not contemplate suicide or hurt themselves when they discovered a familial issue that in past such an instance would have led to suicidal thoughts. They indicated that they would not want to abandon their SD by committing suicide.

There was one pretty intense thing that happened in the last month and it actually happened two days before I came out here and the last time this happened was November last year and at that time I ended up calling every emergency phone number I had ever been given for mental health and suicide and couldn't get a hold of anybody. I sat at the kitchen table and was counting out my pills and saying okay so how many of these do I have and checking online to see how many of them would be required and it just looked like a bad idea and I started thinking about my kids but that was last time. This time [dog] and I went and hid in the basement and he sat with me. I played video games. He was on my lap and we were just chilling. I didn't go over the tipping point (Veteran 2, 1 month).

***Sense of purpose.*** The Veterans recognized that regardless of how they may have felt on any given day, they needed to meet the basic care needs of their SD. This led to the Veterans feeling useful, needed, and purposeful. Some of the Veterans reported that when they experienced a low mood, they seemed to perceive their SDs as pushing them for walks outside. Meeting the SD's need to relieve themselves outside was also a reported reason for many of the Veterans to get out of bed in the morning. The SDs also seemed to give the Veterans something to focus on or do, a reason to be a good person, and someone to talk to. Some Veterans also viewed their relationship with their SDs like a parent-child relationship, and similar to children, the SDs depend on the Veterans for survival but unlike children the SD will never leave home.

***Mental wellness.*** For some Veterans, their SDs made them more aware of their own mental state, helped them be present and in the moment, offered a mental distraction, helped them focus less on their own challenges, and be less impulsive.

[Dog] helped me a bit with that [pain management] because when she needs to go outside for pee or something she doesn't care if I have pain or not, she needs to go outside, so I say okay so I kick my ass and wake okay I need to go outside with her and it is a good thing because I am focusing on her during that period of time so going outside is maybe two or three minutes but for those two or three minutes I am not thinking about my pain I am focusing on her and come

back and give her a treat and say, ‘oh good girl’ so during that time I am not focusing on my problems (Veteran 5, 3 months)

***SD-specific trained skills.*** The specific skills the SDs were trained to do reportedly made a difference in the lives of the Veterans. For example, many of the SDs had the backs of or “*watched the six*” of the Veterans when they were out in public, which helped buffer hypervigilance feelings that arose for them. The Veterans reported that they felt more comfortable being in public and overcrowded spaces with a SD by their side. The SDs also forced the Veterans to calm down or regulate their emotions if they became anxious or agitated. The SDs achieved this by jumping up, leaning into the Veteran, barking, staring, deliberately misbehaving, or whining at the Veteran, at which point the Veteran would pay attention to them and pet their fur (i.e., get back to the present moment and regulate). Some of the SDs were also trained to wake up a Veteran who was having a nightmare.

[Dog] won’t let me work with him if I am ramped up. I went to take him out for a walk and we got out into the front yard and he is flattened out on the lawn and he was not moving and I turned around ‘What the hell.....[said in loud tone] okay you are probably right we should probably go inside’ and as soon as I turned around to go back inside he was like yes okay let’s go....There is also a behavior that he started doing at home recently because I sort of blanked out for a month/month and a half and I ended up sitting in the living room waiting for people to come home basically and watched Netflix and stuff and he started this thing where he would just stare at me until I paid attention like boring his eyes staring and as soon as I paid attention to him he would start [makes little barking noises]. Anyway, he would start vocalizing at me and if I didn’t pay attention he would then start barking and nipping at me and he was like ‘okay you didn’t pay attention, now we have to go play’ and then we would go play (Veteran 2, 3 months).

### **Challenges Working with SDs**

While the Veterans hoped to see decreases in their PTSD symptoms, the introduction of the SD for some individuals resulted in increased stress, anger, depression, as well as feeling triggered and a decreased ability to concentrate. For one Veteran in particular, these feelings subsided only after they relinquished their first SD and acquired a second. With the new SD the Veteran felt calmer, more relaxed, more positive, and more optimistic. However, not all of the Veterans were able to at first detect changes in their emotions, thoughts, and behaviour after working with their SD. Oftentimes, close friends, family members, mental health professionals, or AUDEAMUS, Inc. trainers would recognize the positive changes and point them out to the Veteran.

I feel that her interruptions could be a bit better like more tailored to me. It is hard to even say because when I am in that I don’t even know if she did anything or not to be honest because like I said when I was at the psychologist when she put her paw on me, it took me a long time to notice so how many times does it go on but I definitely don’t need a dog that jumps on me and she doesn’t do that so I like that (Veteran 1, 3 months).

While the SDs performed many beneficial tasks, the most reported drawback of having a SD was needing to train with them and keeping a regular training schedule, especially if they were working with a young dog. While most of the Veterans grew up with pets, including dogs, none of them had knowledge or dog training skills required for a SD level when they began the program.

As such, they had to learn how to train their dog and manage expectations regarding training progress. One of the main set of expectations the Veterans had to manage was recognizing that the dogs would not change quickly and would only learn if training was consistent.

I have neglected the training and not having somebody there saying you have got to do this, got to that I just feel we have lost out something amiss and this is it we are not doing what we are supposed to be doing and it is great hey [dog] touched or she touches there and this and that and then you don't do that again for another few days well and then I wonder why she is not doing it anymore well it is my fault because I haven't been doing it with her so yes a lot of stresses that way (Veteran 3, 9 months).

I want to be able to give some tasks or work for [dog] to do to help me but I need to be patient and go step by step. For sure if you ask me if I had a chance for a week at a good training to be sure that [dog] knows everything and can do everything oh yes I would go for that but I know that it is not possible. It is a long process and at the beginning I didn't realize that but now I realize it but at the same time it is a good thing because we need to progress slowly to be sure that you do it correctly and she is doing it correctly. I am confident that she will be able to do some tasks given for me, when I don't know, as soon as possible if that is possible but it is coming (Veteran 5, 3 months).

If the dogs were younger/puppies or less experienced, basic training (e.g., simple commands such as sit or training to relieve their bladders outside) would often compound frustrations with SD-specific training.

So I started to train, I did first class training with her and at the beginning it was ugh why did I do this, it is a lot of trouble, I don't need that in my life, I am not sure and blah, blah, blah so I went on my trip and came back and restarted again from the beginning the relationship with the dog but day after day was better and easier and in the last few days since I joined the training session she showed me what she can do; it maybe looks strange when I see that but she is working hard and I recognize that and she tried to understand why I tried to do what I was doing with her and she would look at me and I can see in her eye you want to do this and day after day it was changing (Veteran 5, baseline).

Depending on how well trained a SD was, the quality of public interactions ranged and sometimes triggered feelings of anxiety and stress for the Veterans. Some of the Veterans reported instances when they felt embarrassed because their SD reacted and jumped or barked at people. The Veterans reported feeling unwanted pressure to interact with people who wanted to pet their SD or were curious about why they needed an SD.

I don't take her to the stores anymore....Because I don't really have an issue going into public if she was actually getting out into the public right and so I am finding that when I take her to stores in [location] there is such an uneducated population towards service dogs which was very surprising but I guess in [location] like it is not hard for the stores to talk to each other because it is so small but in [location] finding an apartment with her was hard. The only way I found an apartment was I showed up for an interview and I happened to know the guy that... I won't say denied access but it gets to the point where I am raising my voice at people, I am telling the store owner I am not leaving, call the police if you don't like it and I have the right to do that but it is not what

I need in my life right now at this point like if I was in a wheelchair people wouldn't bother me and so for the sake of both of us because it gets pretty heated (Veteran 1, 3 months).

Overall, the Veterans were hopeful and optimistic about their future with a SD but recognized that much more training was required before the dogs could accurately detect their needs (e.g., emotional management and regulation). On average, SDs in the AUDEAMUS, Inc. program are involved in two full years of training before full public access is granted. The Veterans in this project were interviewed up to the one-year point. This is important to note because most drop-outs occur in the first few months of being in the program compared to the one-year mark.

### Discussion

The purpose of the current study was to identify the potential benefits of SDs for Veterans with PTSD and comorbid problematic substance use within the zooeyia framework. Each component of the zooeyia framework (i.e., building social capital, harm reduction, motivation for healthy behaviour change, participation in treatment plan) was identified in the reported experiences of Veterans working with SDs, albeit to varying extents. For example, potential benefits of the SD to Veteran familial relationships were hardly discussed. Numerous benefits to working with a SD were reported by the Veterans, such as aiding social interactions, increasing physical activity, reducing PTSD symptoms, and to some extent reducing substance use. Recognition and strengthening of the human-animal relationship among Veterans with their SDs, and the subsequent bond, is a key component and step in enhancing zooeyia (Hodgson & Darling, 2011). However, Veterans also reported challenges to working with a SD such as needing to be with their SD most of the time and take them everywhere, training, meeting the SD's daily needs, relationship building and bond development, finding the right type/breed of dog, monetary and emotional costs, integrating an SD into the family home, navigating public spaces and interactions, incurring stress, and increased physical activity exacerbating pre-existing ailments or leading to the development of new ones. While some of these challenges reflected common concerns with pets (e.g., relationship building, meeting daily needs of SD), others were more SD-specific (e.g., advanced/consistent training, navigating public spaces). Hodgson et al. (2015) identified potential drawbacks and risks to having a pet, such as the negative effects of losing a pet, zoonotic disease transmission, as well as drains on social and emotional resources. The Veterans and their SDs faced some challenges specific to their context and the Veterans' comorbidities that were in addition to those identified by Hodgson et al. (2015) for companion animals in general, thus extending our understanding of zooeyia within the context of Veterans and SDs. With respect to the HAB, our understanding of its link to zooeyia is further clarified in that many of the challenges Veterans faced with their SDs appeared to be diminished or mitigated as training progressed and the bond with their dog strengthened.

Dogs have a long history of contributing to military service and operations (Carper, et al., 2016; Chumley, 2012). For the most part, these dogs have been primarily trained and engaged with as agents with a task to perform, and minor consequent attention has been paid to the presence of the human-animal bond and its potential beneficial impacts (Dell et al., 2017). This is evident, for example, in common military policy dictating that working dogs be reassigned to a new handler upon a current handler's completion of their tour, regardless of the HAB and the handler's desire to continue with the dog and vice versa (Evans et al., 2007). Much anecdotal evidence and some emerging academic literature identifies the presence and benefit of the HAB among military working dogs and their handlers (Ioanes, 2019; Grossi 2017), and which can also contribute to increased animal welfare (Lefebvre, et al., 2007).

As the SD field has emerged, using many of the same training techniques applied with military dogs and other working dogs, little emphasis has been explicitly placed on the HAB as a key foundation to the development of this working partnership (LaFollette, et al., 2019). More recent, some SD training organizations, like the one in this study, have adopted a holistic approach that recognizes the technical skills the dogs are trained to perform in Veterans' lives *and* the HAB.

Recognition of the HAB supports the emerging research on dogs over the past several years that indicates they have a unique ability to bond with humans. For example, a study by Berns (2020) on dogs' social compatibility with humans used MRI brain imaging to better understand dogs' unique intelligence and how they have evolved to form bonds with us. Similar studies have explored the experience of human-canine love (Wynne, 2019). In fact, the history of the domestication of dogs suggests their innate ability to be present with perceived non-judgmental warmth, companionship and bonding, and in turn nurturing the ability of humans to love and trust (Chandler, 2005; Levinson, 1984; Melson & Fine, 2010). The companion animal literature is now identifying the bond humans have with their domestic pets, in particular dogs. This is illustrated, for example, in their identified role as family members, money spent on them annually, and the fact that they are grieved. At likely no other point in recent history has evidence of the HAB become more apparent than during the global COVID-19 pandemic. Stories of overwhelming numbers of animal adoptions have resulted in many emptied shelters (Haack, 2020). Research outcomes are also emerging that highlight the role of the HAB and the strengths and challenges of human-animal relationships during COVID-19 and the harmful impacts to humans of physical and social distancing (Applebaum et al., 2020; Hunjan & Reddy, 2020; Ratschen, et al., 2020). As a result, we may end up with greater recognition of the HAB within the content of SDs.

It should not be surprising, then, that recognition of the HAB supports key components of Veterans' treatment for PTSD and substance use recovery. The zooeyia framework applied in this study identified how the Veterans' bonds with their dogs supports the framework's four key benefits of domestic animals to human health. As *builders of social capital*, SDs provide companionship, develop bonds with the Veteran, and encourage the Veterans to engage in social situations. The Veteran and PTSD literature outlines how each of these areas are concerns in the lives of Veterans diagnosed with PTSD; they self-isolate in their home environment and from others and experience loneliness (Zatzick et al., 1997; American Psychiatric Association, 2013; Foreman & Crosson, 2012). This is not unlike concerns raised for individuals who use substances to a problematic extent (Volkow & Li, 2005; Bruno & Csiernick 2018; Coulter, 2018). In fact, some substance use literature identifies the absence of human bonding as a precursor to addiction (Hari, 2016).

As *agents of harm reduction* SDs were found to decrease Veterans' substance use and road rage. Anger, rage and violence are common symptoms of PTSD among Veterans (American Psychiatric Association, 2013). The SD's role in keeping the Veteran in the present moment is similar to Cognitive Behavioural Therapy treatment techniques applied with Veterans (Wenzel et al., 2011). The Veterans' decrease in substance use complements emerging research on addictions recovery and animals, and specifically pets and AAIs. A 2016 national survey of recovery from substance abuse in Canada concluded that 88% of Canadians identified their relationship with animals or pets as an important support in their recovery from addiction, and 44% found their relationship with animals or pets to help in continuing their recovery from addiction (McQuaid et al., 2017). Wesley, Minatrea and Watson (2009) found in their study at an adult residential substance abuse program that clients were more likely to open up in the presence of a therapy dog about their histories of violence and trauma. As well, a case study by Dell and colleagues (2019)

on the impact of a visiting therapy dog at a methadone clinic found that the therapy dog prompted the patient to decrease her drug use. Dell also co-published a recent study with clients at the same methadone clinic, concluding that in their recovery journeys “companion animals fulfilled supportive roles that other humans could not or chose not to provide” (Kosteniuk & Dell, 2020). It should also be mentioned that harm reduction is a key approach in contemporary approaches to addictions recovery, “including abstinence, improved health, social connections and functioning, and higher quality of life” (McQuaid et al., 2017, p. 2).

Service Dogs were *motivators for healthy behavior change* by encouraging increased physical activity among the Veterans and their caregiving for the SD and self-care for themselves. We know from the PTSD literature that sedentary lifestyle and poor self-care are common trademarks of the disorder (APA, 2013; VAC, 2019a). Addressing these are important components of recovery from addictions as well (McQuaid et al, 2017; Acoose, 2015; Schenck, 2009). It should also be stated that there is a recognized overlap in the conditions of PTSD and problematic substance use – ranging from the stigma experienced (van Boekel et al., 2013) to the neurobiological interface between substance use disorders and other psychiatric disorders (Brady & Sinah, 2005).

As *active participants in the Veterans’ treatment plans*, SDs have been identified as a compliment to regular care (Husband et al., 2020). The development of a bond and sense of purpose the Veterans’ gain from training the SDs are, once again, key components of Veteran need identified in the PTSD treatment literature (Dell et al., 2017; Yarborough et al., 2017). It has been reported that interacting with dogs can, for some, parallel the social support experienced in human-to-human relationships (Fine & Beck, 2010). These are likewise key components of the substance use recovery and pet literature. For example, the four dimensions identified by SAMHSA (2017) that support a life in recovery (purpose, community, health and home, and the impacts of trauma, with hope identified as the foundation of recovery) were identified in a study by Kosteniuk and Dell (2020). They concluded that companion animals have a unique, supportive role in each of the four dimensions, and expanded, for individuals in recovery for opioid addiction. This would potentially amplify for PTSD diagnosed veterans with SDs.

The current results suggest there may be a need to further develop and refine the zooeyia framework. For example, beyond highlighting the potential benefits of pets or SDs, additional potential drawbacks and risks could be built directly into the zooeyia framework when considering SDs. The concept of zooeyia as it is currently defined is reasonably anthropocentric and lacks an emphasis on the mutual relationship between humans and animals (i.e., HAB), as well as the potential benefits and risks for the animals. The stakes are high for dogs that become SDs and work with Veterans who are trying to manage their PTSD and substance use symptoms. In addition to serving as companions, SDs are working animals. Many of the dogs are not specifically bred for this type of work but are sourced from shelters and undergo rigorous training which they may or may not be best suited for (Lucidi et al., 2005; Weiss, 2002). Animal welfare considers the way in which an animal copes with its living conditions and whether it is “healthy, comfortable, well-nourished, safe, able to express innate behaviour, and if it free from suffering, pain, fear, and distress” (Garcia, 2017). For SDs to be ethical, they must generate positive value and diminish suffering for humans, animals, and the environment (Hediger et al., 2019). The concept of One Welfare may be important to draw upon for extending the zooeyia framework, particularly when examining it within the context of SDs. Animal health is at the center of One Welfare, which highlights the “interrelationships between animal welfare, human wellbeing, and the physical and social environment” (Pinillos, et al., 2015). One Welfare is recognized as partially overlapping and

extending the One Health approach (One Welfare, 2020). Further attention to the concept of positive welfare may also be important, extending Hediger et al.'s (2019) attention to positive value. Positive welfare is generally understood as accounting for the positive experiences that animals have and not just the absence of negative ones (Mellor et al., 2020).

In cases where a dog is determined to be unsuitable for SD work or not a good fit for a Veteran and is subsequently retired, rehomed and/or reassigned, it is unclear how these situations affect the dog, especially if they have formed a bond with their handler. This issue arose for one Veteran in the current study who reported difficulty forming a bond with their first SD and integrating them into the family home. Another Veteran relinquished his SD to AUDEAMUS, Inc. after one year when he assessed that he no longer needed them, regardless of the mutual bond that may have formed. While it is important to recognize and take quick action when a dog and Veteran are not a good fit together for the benefit of each, such instances highlight the importance of prioritizing animal welfare and fostering the HAB. There are some proactive strategies to consider with SD-handler matching, including assessing the suitability of dogs as well as Veterans' needs and lives more thoroughly before matching them. Potential strategies to employ after a SD and Veteran are matched could also include providing support for fostering the HAB and offering additional support for integrating the dog into the family unit.

### **Strengths and Limitations**

This study presents one of the first applications of the zooeyia framework to examining SDs working with Veterans diagnosed with PTSD and comorbid substance use. While the small sample size and limited representativeness may limit external validity (Devroe, 2019), it offered the chance for more in-depth exploratory analysis (Sandelowski, 1996), and highlights the need for further and broader contextual applications of zooeyia. The use of varying spontaneous follow-up questions across the Veterans is another potential limitation as it could lead to data and analysis inconsistencies. However, a benefit to thoughtful and spontaneous follow up questions is the added richness and validity they can provide to the data as they can improve meaning for both participant and interviewer (Bolderston, 2012). Given that four of the five Veterans in the current study were of Indigenous ethnicity, not examining Indigenous worldviews that acknowledge the connection between the land, animals, and humans is another limitation to note. It may be the case that the Indigenous participants who acknowledge their Indigeneity may have had a greater insight because of a holistic worldview recognizing the interconnectedness of humans and animals, and their importance to military success, compared to the non-Indigenous participant (VAC, 2017a, para. 14).

Further study in this area would benefit from accounting for the structure and process of the SD training program itself, as it too was identified by the Veterans as a source of connection. This ranged from the structure of the training sessions with other Veterans through to peer support gained from training with other Veterans and their SDs. Longer term follow-up of the Veterans' and their SDs would provide further insight into the HAB, especially considering this study identified the relationship between the Veteran and their SD emerging over time and into an eventual bond. Related, and as mentioned, additional study of the HAB and attention to animal welfare is a necessary. Further, all of the Veterans in this study were male, and the development of a SD bond for females and other gender identities among military Veterans is important. For example, female Veterans are at particular risk for interpersonal violence, contextualized within their experiences of sexual assault and harassment during military service (Rossi et al., 2020). And last, the SD program in this study required Veterans to train their SD, and it would be interesting

to examine if the trajectory of the bond formation differs for Veterans who train a SD with those who are matched with a trained SD.

### Conclusions and Next Steps

Findings from the current study suggest the HAB and zooeyia framework may be useful for understanding the role of SDs in the lives of Veterans with PTSD and comorbid substance use. Recognition of the human-animal relationship among Veterans in this study with their SDs, and the subsequent bond, is a key component of and step in enhancing zooeyia, particularly since bond formation was often instrumental in mitigating SD-related challenges for Veterans. This extends our understanding of how SDs support veterans' health, including PTSD and problematic substance use, in addition to the technical skills training of the SDs. Further research is needed on understanding the human animal bond for enhancing zooeyia among PTSD-diagnosed Veterans who have a SD and problematically use substances. There is a need to further explore how SDs may be considered an AAI given the fundamental importance of the HAB in the SDs ability to perform technical skills necessary for the day-to-day functioning of the Veteran. Of particular interest is how knowledge of zooeyia may impact SD organizations and particularly those that focus on individualized training programs for Veteran and SDs pairs. Supporting the development of the HAB can be a fundamental component to Veteran and SD partnerships where the potential benefits of zooeyia can be leveraged as an additional and often unrecognized resource. An argument can be made for expanding the zooeyia framework by considering potential drawbacks and risks for both Veterans and SDs working together, as well as animal welfare and the mutual benefits of the HAB. With an understanding of the HAB as being reciprocal, it also challenges One Health to recognize animal welfare and enhancement.

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