

Learning from Technology-Assisted Data Collection

Purpose, Background & Participants



Initial findings of data collected with the assistance of technology.

Purpose: As part of a project titled *A PAWSitive Support Project for Veterans with Posttraumatic Stress Disorder (PTSD) and Substance Use Health Concerns*, this Fact Sheet presents the initial findings of data collected with the assistance of technology in a study that examined the impact of service dogs in the lives of Veterans experiencing substance use health concerns. All Veteran participants were part of the AUDEAMUS, Inc. service dog program. Data was collected through: (a) wearable technology such as a watch (i.e., FitBit) to measure heart rate and sleep quality and quantity and other types of an individual's movement and exercise, and (b) the Ethica© SmartPhone application which gathered data through (i) a self-report questionnaire (e.g., quality of life questions) shared through the SmartPhone, and (ii) automatic data collection that synchronizes with sensors and other wearable technology (e.g., proximity to and time spent with a service dog wearing a Bluetooth beacon). This Fact Sheet focuses on the potential insight this form of data collection can offer about the impact of the bond between Veterans and their service dogs and the technical tasks the service dogs provide.

Background: Service dogs are trained to assist their handler with symptoms and limitations from trauma, injuries and disabilities. There are federal and varying provincial access rights for service dog teams in Canada (e.g., provincial legislation and regulations, Human Rights Codes and case law legislation). Generally, service dogs are visibly identified with a vest and have full access to public spaces because they are trained to perform tasks to support their handler. Service dogs can be trained by organizations, independent dog trainers, or in some cases by their handler or another individual, with or without the assistance of a dog trainer. Most service dog trainers and service dog organizations assess the suitability of a dog for service dog work prior to and/or during the training process.

Service Dog Program: SAUDEAMUS provides service dogs to Veterans, Police Officers and First Responders. Many of the Veterans have returned home from deployment in combat zones. The Veterans typically train with the service dogs for 52 weeks, applying AUDEAMUS's holistic training curriculum (www.audeamus.ca/program). Peer support is a foundational component of the AUDEAMUS program.



The health of animals,
humans and the environment
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Purpose, Background & Participants *(continued)*

Connection: Our multidisciplinary team identifies that posttraumatic stress disorder (PTSD) and problematic substance use (PSU) can contribute to Veterans' disconnection from other humans, as well as animals and the environment. A One Health framework recognizes that the convergence of people, animals, and the environment has created a new dynamic in which the health of each group is interconnected (CDC, 2021). The interdependence of the wellness of humans, animals and the environment has been traditionally recognized from within an Indigenous worldview (Papequash 2011; Honouring Our Strengths 2014). Considering PTSD and PSU simultaneously within this framework is an innovative and inclusive approach to mental health and substance use recovery.*

* The term recovery is variously referred to, including: being in recovery, seeking recovery, wellness, health, healing journey, to name a few. Common elements amongst definitions of recovery are seeking a life worth living, optimism that recovery is possible, recognition that it is a process, and acknowledgement that there is always hope (McQuaid, 2017).

To learn more about the role of service dogs in the lives of Veterans diagnosed with PTSD who problematically use substances, please refer to the resource list at the end of this Fact Sheet.

Participants: According to Veteran Affairs Canada (VAC), a Veteran is "[a]ny former member of the Canadian Armed Forces who successfully underwent basic training and is honourably discharged" (Veteran Affairs Canada, 2021). In this study, the "Veterans included five males with a mean age of 43 years (range 36–51 years) who provided a full year of research data. Two veterans self-identified as Métis, two as Caucasian/white, and one as First Nations. All veterans had at least some college- or university-level education. Most of the veterans (n = 4) grew up with pets, some with dogs (n = 3). At the beginning of the project, two veterans did not have any household pets. Among the other three veterans, one individual had two dogs (one of which became his first service dog), another had two cats and two dogs, and the third had one lizard and one cat." (Williamson, Dell, Osgood et al., 2021). More information on the Veterans' background is available in the published article: Williamson, L., Dell, C., Osgood, N., Chalmers, D., Lohnes, C., Carleton, R., Asmundson, G. 2021. Examining Changes in Posttraumatic Stress Disorder Symptoms and Substance Use among a Sample of Canadian Veterans Working with Service Dogs: An Exploratory Longitudinal Study. *Journal of Veterans Studies*. 7(1), pp. 1–13.

Service Dogs: "Three veterans were matched with dogs through AUDEAMUS, Inc. Working with one service dog supplier allowed for some consistency in the participant experience and had no bearing on how the research project was implemented. The other two veterans trained a family dog. Around the 6-month time point, one veteran accepted limitations of their service dog in training (i.e., dog's anxiety and limb injuries) so it was retired as a family pet and replaced through AUDEAMUS, Inc. Another veteran requested a female dog around the same time point and was subsequently matched with a female service dog by AUDEAMUS, Inc." (Williamson, Dell, Osgood et al., 2021).



The data was analyzed using two different tools, Julia and Python, common computer science data analytic tools.



Methods & Program

Method: The technology-assisted data collection occurred from May 2018 to May 2019. FitBit watches were issued to the Veterans at the start of the study. The Ethica© Smart-Phone application was installed on the Veterans' mobile phones at the beginning of the study to collect both self-report questionnaire and automatic data. Non-invasive Bluetooth beacons were installed on the service dogs' collars by August, 2018. Each data collection method had challenges associated with it (e.g., cannot immerse a FitBit in water, forget SmartPhone, not realize Bluetooth beacon battery expired).

Only data collected through the Ethica© SmartPhone application is reported on in this Fact Sheet. Specifically examined is:

(i) self-report questionnaire data, where one random question was asked from a set of ten, four times a day, and the Veteran had 1.5 hours to answer or it would be skipped; and

(ii) automatic data collection for Bluetooth data from the beacons on the service dogs' collars and pedometer data.

The data was analyzed using two different tools, Julia and Python, common computer science data analytic tools enabling high-level programming language. The Bluetooth beacon data was plotted according to how long it was in contact with the Veterans' SmartPhone during a 24 hour period, indicating how long a Veteran spent with their service dog. The pedometer data was plotted using a moving average window of one month. This allowed the data to be smoothed out over the time period and thus for trends to be pronounced. The Bluetooth beacon data and pedometer data was overlaid with responses from different questions asked of the Veterans (i.e., Have you felt an emotional bond with your dog over the past 3 hours?, Has your dog done anything to help you in the past 3 hours that it was trained to do?, If there was a chance to leave the house in the next 3 hours how would you feel about that?, How present or in the moment have you felt

over the past 3 hours?, How irritable have you felt over the past three hours?). This allowed for visualization and interpretation of the responses on how they might relate to the movement of the Veteran or the time the Veteran spent with their service dog.

Ethics: The human and animal Research Ethics Boards (REB) at the University of Saskatchewan each approved the larger research project [17-317 and 20170114].

Limitations: Some of the key limitations for this form of technology-assisted data gathering are as follows. As mentioned, at times the Veteran did not have the technological device (i.e., SmartPhone) with them. Responses to the Ethica© SmartPhone application questions have the potential for responder bias. One reason may be because the service dog is supposed to be filling a certain function, both bond and skill based. Third, inputting a negative response to the question is easy for the Veterans to ignore, and so their experience may not be fully captured.



Findings

The technology-assisted data examined in this Fact Sheet indicated that the Veterans' wellness generally improved over the course of the study. Indications of this as well as the uniqueness of their experiences are highlighted. Also outlined are challenges with data collection.

Overall, there was a common upward trend or stabilizing quality in the data collected from three Ethica© SmartPhone application questions: "How present or in the moment have you felt over the past 3 hours?", "How irritable have you felt over the past three hours?", and "If there was a chance to leave the house in the next 3 hours how would you feel about that?".

The data also indicated that the wellness paths for the Veterans varied considerably. Pedometer data indicated that all Veterans were less active during the winter months with their service dogs, but some significantly less so. This could indicate, for example, that one's specific dislike or inability to be outside in the winter climate should be considered in their wellness journeys.

This variability in the Veterans' wellness plans supports the findings of non-technology assisted data collected and analyzed for the project. For example, examining standardized measures (i.e., Posttraumatic Stress Disorder Checklist for the Diagnostic and Statistical Manual for Mental Disorders, 5th Edition, & Drug Use Screening Inventory Revised Substance Use Subscale) and one-on one semi-structured interview data with the Veterans at three months intervals over the one year period, Williamson, Dell, Osgood et al. (2021) observed that "[t]hroughout the research, each veteran reported experiencing diverse challenging life circumstances. Some of the veterans moved to new homes, ended romantic relationships, dealt with family conflicts, suffered physical injuries, managed illnesses/chronic health conditions, and accessed medical treatment for their SDs (e.g., allergies). Each veteran underwent a variety of physical and mental health treatments over the course of the year, such as physical rehabilitation, medication changes, written exposure therapy for trauma, Operational Stress Injury clinic programs, counseling sessions, psychiatric sessions, as well as group cognitive-behavioral therapy sessions for pain management and trauma. This was similar to their experiences prior to taking part in the research, with various attempts at coping with their PTSD symptoms and the concerns they posed, personally and within their communities. Further, it is common for veterans to approach a SD [service dog] organization when traditional treatment options are not aiding them in adequately managing their PTSD symptoms" (Williamson, Dell, Osgood, 2021).



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Participant #5 had a clear increase in their 'yes' responses to the question "Has your dog done anything to help you in the past 3 hours that it was trained to do?".



Findings (continued)

Highlights of the Veterans' individual data are outlined here, alongside what the data may potentially be indicating.

Veteran Participant One:

This Veteran's adherence to data collection decreased over the course of the study. With this in mind, the collected data indicated that the proportion of times the Veteran answered 'yes' or 'no' to the question "Have you felt an emotional bond with your dog over the past 3 hours?" in a given month changed. At the start of the study, a 'no' response was typically greater or equal to the number of times the Veteran answered 'yes' in a month. In the later stage of the study, the Veteran more frequently answered 'yes' to this question and their 'no' response decreased. *This finding may be an indication of an increasing bond between the Veteran and service dog being established.*

Veteran Participant Two:

The emotional bond this Veteran felt with their service dog appeared to have decreased over the course of the study, evident in their response to the question "Have you felt an emotional bond with your dog over the past 3 hours?". However, this Veteran acquired a new service dog mid-way through the study, which likely accounts for the regression. There was also an increase in 'yes' and a decrease in 'no' responses when asked "Has your dog done anything to help you in the past 3 hours that it was trained to do?". *This finding may be an indication of the initial service dog improving their skills as a service dog, and this continuing even more so with the second service dog.*

Veteran Participant Three:

This Veteran's response to the question "Have you felt an emotional bond with your dog over the past 3 hours?" indicated no clear increase over time, but they did answer 'yes' more frequently than 'no'. Their response to the question "Has your dog done anything to help you in the past 3 hours that it was trained to do?" indicated a downward trend. To contextualize both of these findings, this Veteran also switched their service dog part way through the study. It is interesting to note that this Veteran's irritability ranking was stable over time with less spikes compared to the start of the study, when asked "How irritable have you felt over the past three hours?" *This finding may indicate that working with a service dog (bond and/or skill focused), regardless of the specific service dog, assisted the Veteran with this aspect of their wellness.*

Veteran Participant Four:

This Veteran rarely responded 'no' to the questions "Have you felt an emotional bond with your dog over the past 3 hours?", and "Has your dog done anything to help you in the past 3 hours that it was trained to do?". A very clear, positive trend toward the end of the study was also indicated in the Veteran's positive response to the question "If there was a chance to leave the house in the next 3 hours how would you feel about that?". *This finding may be an indication that the service dog had a beneficial impact on the Veteran's wellness.*

Veteran Participant Five:

This Veteran had a clear increase in their 'yes' responses to the question "Has your dog done anything to help you in the past 3 hours that it was trained to do?". Their responses to the questions "If there was a chance to leave the house in the next 3 hours how would you feel about that?", and "How present or in the moment have you felt over the past 3 hours?" decreased for a short time near the mid-point of the study. The response values returned to where they were initially after this period and stabilized for the remainder of the study. *This finding may be an indication of challenges in the Veteran's life and wellness involving/or not involving their service dog, or a combination of the two.*



Summary & Resources

Summary of Findings:

According to the technology-assisted data collected, each Veteran had a unique experience with their service dog. For example, the pedometer data indicated a trend in lower step count as time progressed toward the winter months amongst all Veterans, but it was more pronounced for some. This could indicate that one's dislike or inability to be outside in the winter climate needs to be considered in their wellness journeys. At the same time, there are some pronounced trends across all data sources and Veterans examined, indicating that the Veterans' wellness generally improved over the one-year period of the study. For example, the Ethica@SmartPhone data indicated that generally the Veterans identified a bond more often than not with their service dog, even if the response rate decreased over time (and for varying reasons). This was evident in response to the question "Have you felt an emotional bond with your dog over the past 3 hours". Similar stability or a positive upward trend was identified amongst the Veterans in response to questions indicating the service dogs' skills and/or bond: "If there was a chance to leave the house in the next 3 hours how would you feel about that?", "How present or in the moment have you felt over the past 3 hours?", and "How irritable have you felt over the past three hours?".

Next Steps:

This Fact Sheet is the first attempt to examine technology-assisted data for some potential insight on Veterans' wellness associated with their service dogs. There is much left to do with the data. This initial analysis, though, shows that it was a feasible means data collection amongst the study population, while acknowledging the challenges and consequent data limitations. The amount of technology-assisted data collected was extensive; enough to travel to the moon and back if lined up. Meaningful next steps could include examining all of the data collected for the study (technology and non-technology assisted) together, and doing analyses specific to data collected on the Ethica@SmartPhone application question "Have you used psychoactive substances in the past 3 hours".

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Summary and Resources (continued)

Resources (from our team)

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Resources (from other teams)

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