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When Therapy Dogs Provide Virtual Comfort: Exploring University Students' Insights and Perspectives

Christine Yvette Tardif-Williams
Brock University, ctardif@brocku.ca

John-Tyler Binfet
University of British Columbia, Okanagan, johntyler.binfet@ubc.ca

Freya L. L. Green
University of British Columbia, Okanagan, fllgreen@ubc.ca

See next page for additional authors

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Cover Page Footnote

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Authors

Christine Yvette Tardif-Williams, John-Tyler Binfet, Freya L. L. Green, Renata P. S. Roma, Akshat Singal, Camille X. Rousseau, and Rebecca J. P. Godard

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When Therapy Dogs Provide Virtual Comfort: Exploring University Students' Insights and Perspectives

Christine Yvette Tardif-Williams,[1] John-Tyler Binfet,[2] Freya L. L. Green,[2] Renata P. S. Roma,[1] Akshat Singal,[2] Camille X. Rousseau,[2] Rebecca J. P. Godard[2]

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Abstract With the proliferation of canine-assisted interventions and the emphasis placed on the impact of these sessions in bolstering the well-being of visitors to sessions, especially university students, it can be easy to overlook just how participating in one of these sessions is experienced by participants. Capturing participants' experiences is important as this holds the potential to inform program design and delivery and elucidate mechanisms within the intervention that were found to be especially efficacious. Forging new empirical terrain, this study explored the insights and perceptions of 469 undergraduate students who participated in a virtual canine-assisted stress-reduction intervention at a mid-size western Canadian university. Participants were randomly assigned to synchronous or asynchronous and dog or no-dog conditions and were asked to share their views of their experience by rating statements and responding to open-ended prompts. Thematic content analysis of findings revealed that a virtual canine-assisted intervention was well received by participants. Participants in the synchronous condition with a dog reported more favorable well-being benefits, as compared with participants in the asynchronous condition with a dog and with participants in both the synchronous and asynchronous conditions without a dog. Implications of these findings hold relevance for supporting geographically remote students and students for whom attending virtual sessions is the only option given barriers preventing them from in-person attendance. Correspondingly, considerations of the role of the handler and of animal welfare are presented.

(1) Brock University, (2) University of British Columbia, Okanagan

Introduction

In recent years, postsecondary institutions have reimagined and reconfigured their delivery of mental health services to meet the needs of a growing and diverse student body whose engagement includes in-person attendance, remote participation, and hybrid participation. Several factors account for the proliferation of online mental health services within postsecondary institutions, including the well-documented rise in mental health challenges among postsecondary students (Durand-Bush et al., 2015; Othman et al., 2019; Statistics Canada, 2019). Additionally, other reasons include students' increasing use of technology for learning, the current COVID-19 pandemic, and the push to expand accessibility for geographically remote students and students with disabilities and mental health challenges, which often prevent students from accessing in-person services.

A systematic review on the effectiveness of mental health interventions remotely delivered to university students indicates that such approaches have been used for a long time (Davies et al., 2014). Researchers have explored the usefulness of both web- and internet-delivered interventions (e.g., mobile-based strategies, use of text and video) to support the social and emotional well-being of university students (Kählke et al., 2019; Klein et al., 2011; Nguyen-Feng et al., 2017; Ruppel & McKinley, 2015). These interventions were not only embedded in programs to promote well-being and prevent the onset of mental health problems but also were used to improve symptoms related to anxiety and depression, among others. Although progress in terms of heterogeneity of samples and postintervention assessment is required, Davies and colleagues suggest that, overall, these programs and interventions may be a valuable resource to promote well-being and offer psychological support to university students.

On-campus canine-assisted interventions (CAIs) represent a relatively low-cost, low-barrier, and easily accessible intervention to support well-being, and increasingly, canine stress-reduction programs are found across postsecondary institutions (Crossman & Kazdin, 2015). Considered an adjunct intervention, these programs are not intended to provide primary mental health support but rather, afford opportunities for students to reduce stress and increase their sense of community and social capital while on campus—factors that may, in turn, facilitate their seeking formal avenues of mental health support. Attending such sessions has been shown to reduce stress and homesickness and bolster overall well-being (e.g., Barker et al., 2016; Binfet, 2017; Binfet & Passmore, 2016; Binfet et al., 2018; Crossman, 2017; Parbery-Clark et al., 2021; Pendry & Vandagriff, 2019; Rothkopf & Schworm, 2021). Research to date has focused on in-person CAIs; however, there is emerging evidence showing that virtual CAIs can also optimize student well-being.

Virtual Canine Interventions to Support Student Well-Being

In a recent randomized controlled trial, university students (N = 467, aged 17–49 years, 80% female) reported feeling less stressed at the end of a 5-minute virtual CAI when a dog was present, as compared to a no dog condition (Binfet et al., 2022). Research by Thelwell (2019) saw university students assigned either to engage directly and individually with a dog for 10 minutes in a lab setting (experimental condition) or to individually view a 10-minute dog video montage (control condition). All participants, regardless of condition, experienced a reduction in their anxiety and an improvement in their mood across time.

In another study, Zhou and colleagues (2020) used an online survey to examine how the self-reported sensual experiences (i.e., sense of "flow" and "social presence") of individuals who have watched pet videos/livestreams might be associated with their subjective well-being. Findings from this study involving 439 young people (aged 21–30 years; 74.55% female) showed that both telepresence (i.e., feeling of "being there") and social presence (i.e., feeling of "being with others") had significant positive effects on "flow experience" and that "social presence" had a significant positive impact on self-reports of subjective well-being in terms of perceptions of life

satisfaction, happiness, loneliness, and stress. Importantly, this study not only supports the positive effect of online pet watching on subjective well-being, but it also suggests some of the social processes or dynamic nuances undergirding this association.

Research by Myrick (2015) examines the complexity of emotional reactions associated with viewing online cat-themed videos. In this study viewing online cat-related content was associated with participants' experiences of positive emotions and energizing feelings postviewing. However, results also revealed that when participants watched online cat videos as a means of procrastination, they experienced guilt or a sense of "guilty pleasure," which can decrease enjoyment and positive emotions postviewing. Research is needed that examines if, and under what conditions viewing online animal-related content might be associated with both emotional benefits and drawbacks.

Using qualitative methodology, the supportive role of a virtual animal-assisted therapy letter writing program for a group of children (N = 15, aged 7–16 years) who had cancer was demonstrated (Gillespie & Neu, 2020). In this study, young cancer patients who were unable to have contact with live animals engaged in a virtual animal-assisted penpal activity in which they conversed through letters with animals (i.e., a cat or dog) who were also receiving treatment for cancer or another serious medical illness. Content analysis of the children's interviews revealed themes of *connection*, *shared experience*, and *friendship*. In another qualitative study, Lalonde and colleagues (2020) conducted in-depth interviews with four female university students who attended an in-person canine program. While this was not a virtual context, similar insights were gleaned from these interviews, which included "being in-the-moment," social benefits, variations in coping ability, personalized interactions, and reciprocal interactions. Related research by Dell and colleagues (2021) studied the perceptions of 94 participants who responded to an online survey after having participated in a virtual canine session. Participants reported receiving feelings of comfort, love, connection, and support from the therapy dogs, mirroring feedback given by students attending an in-person CAI. As the programming used in this study was comprised of diverse presentation formats (i.e., prerecorded and live videos, storybook reading videos, a podcast, and an infographic), there remains a need for research that explicitly explores perceptions of virtual CAIs.

Responding to this gap, the study presented here advances the literature on virtual CAIs by exploring the nuanced perspectives of undergraduate students to better understand which aspects (e.g., presence of dog and/or handler, their prior experience with virtual contexts) of the virtual experience were most helpful for participants. The data for this research are drawn from a larger mixed-methods study (Binfet et al., 2022) and highlight a qualitative component of the study with a view to gaining detailed overviews of students' experiences with virtual canine comfort modules. As part of this larger study, participants were randomly assigned to one of four conditions, which included synchronous and asynchronous prerecorded video groups with and without a therapy dog present. In this way, these four conditions varied in terms of presence of a dog and level of virtual engagement required on the part of the student (see Table 1). The aim of the present study was to elucidate features of the online experience that students considered most helpful. We also asked participants to share their experiences regarding session length, the role of the handler, and their own level of engagement. We anticipated that a content analysis of the themes would reveal unique aspects of the student experience depending on presence of a dog and level of virtual engagement. In keeping with the qualitative aim of the present study, we did not make specific hypotheses about how participants would experience the four conditions. However, generally, we anticipated that participants would prefer the sessions involving dogs and their handlers and the synchronous sessions because they offer an opportunity to interact with others in a context closely approximating real-time social interactions, and they might have a *stress-buffering* effect for participants. The study findings will inform the future design of successful virtual CAIs for postsecondary students and can inspire the design of other virtual

Table 1 Characteristics of the Four Study Conditions

	Synchronous	Asynchronous
With therapy dog present	• 5-minute session on Zoom • Semistructured script utilized • Therapy dog & handler present • 3–5 other students on call	• 5-minute prerecorded video • Semistructured script utilized • Therapy dog & handler present • Students watching alone
Without therapy dog	• 5-minute session on Zoom • Semistructured script utilized • Only handler present • 3–5 other students on call	• 5-minute prerecorded video • Semistructured script utilized • Only handler present • Students watching alone

animal-assisted programs supporting the well-being of diverse groups of people.

Conceptual Approaches Undergirding Virtual Human-Animal Interactions

Conceptually, this study is informed by the buffering hypothesis (Cohen & Ashby Wills, 1985), the theory of media equation (Reeves & Nass, 1996), and research on human emotional regulation (Myrick, 2015). According to the *buffering hypothesis*, those around us are perceived to offer social resources that serve to bolster our ability to cope (Cohen & Ashby Wills, 1985). The intervention upon which participants provided insights for the current study was informed by the buffering hypothesis and was delivered within a small virtual group setting (again, see Binfet et al., 2022). Research on *media equation* and the impact of the current digital revolution on social and animal-based relationships posits that people tend to react to media content in much the same way as they would to real-life interactions, or as if it is happening in real life (Reeves & Nass, 1996). In this way, virtual canine sessions that offer mediated engagement with dogs and their handlers could offer participants similar *stress-buffering* effects as those found in in-person animal-assisted interventions (e.g., Barker et al., 2016; Binfet, 2017; Binfet et al., 2018; Crossman, 2017; Crossman et al., 2015; Pendry & Vandagriff, 2019). Our study draws on these theoretical frameworks to illuminate nuances in postsecondary students' experiences with therapy dogs in a virtual context.

Methods

Participants

Canine Handlers. Participating canine handlers and their therapy canines were drawn from a larger pool of 55 certified volunteer canine handlers who routinely volunteer in a large, on-campus canine therapy program called B.A.R.K. (Building Academic Retention Through K9's). The first six volunteer handlers to respond (*M*age = 49.4 years, *SD* = 11.3, range = 37–67, all White) and whose schedules permitted participation were selected for inclusion. Their average volunteer experience as a canine handler prior to the study was 5.01 years (*SD* = 3.40).

Therapy Canines. Drawn from a larger pool of 56 therapy dogs in the program described above, 6 therapy canines participated in this study under the supervision of their handlers. Participating canines were predominantly female (66%) with an average age of 6.39 years (*SD* = 2.25, range = 4–10 years) and prior canine therapy experience of 4.01 years (*SD* = 2.54). Participating canines included 3 purebreds (i.e., Golden Retriever, Labrador, Norwegian Elkhound) and three mixed-breeds (i.e., a Great Dane/Labrador mix, Golden/Bernese Mountain Dog mix, and a Border Collie cross).

Student Participants. A total of 467 undergraduate students were recruited from a mid-size, western Canadian university (student population

10,708). Their ages ranged from 17 to 49 years (*M*age = 21.0 years, *SD* = 3.8), and the majority of students were in their first, second, or third year of their undergraduate degree (36.0%, 24.6%, and 22.1%, respectively). Participants predominantly self-identified as female (80.9%; 18.8% male; 0.3% nonbinary) and 60.8% self-identified as White, 12.6% as South Asian, 5.8% as mixed race, 5.8% as Chinese, and 2.6% as Aboriginal. The majority identified as currently residing in Canada (81.8%), 91.2% lived with other people, and 53.1% lived with pets. Finally, 89% self-identified as low consumers (i.e., made no or infrequent use) of the CAI program offered on campus.

Procedure

An online research portal was used to recruit participants from undergraduate psychology classes. Students' participation lasted 30 minutes in total and students were offered modest course credit for their time participating in the study. University human (H20-01253) and animal (A18-0222) ethics approval was obtained, and both students and handlers provided informed, written consent before starting the study. Prior to the study, handlers participated in a 30-minute training session and were asked to follow a script for each of the intervention sessions (see Appendix A). Throughout each session, a trained research assistant monitored therapy dog welfare and signs of distress, and no incidents of canine distress were observed.

Sessions. Students signed up for a time slot convenient to them via an online research portal. A total of 33 sessions took place between mid-October 2020 and mid-February 2021. In order to facilitate opportunities for students residing in different time zones, sessions were held at four different time slots and on four days of the week. On any given day, a maximum of 2 sessions were held and dog-handler teams volunteered for a maximum of 2 days per week, thus a maximum of 4 sessions in a single week. As part of the larger mixed-methods study, the students were randomly assigned to one of four conditions (see Binfet et al., 2022) to assess the effects of a virtual CAI on student well-being. These four conditions included synchronous Zoom and asynchronous prerecorded video groups, each with and without a dog-handler team present. To ensure consistency in student experience, the synchronous Zoom session groups all contained a handler, a researcher, and 3–5 participants (*M* = 3.57). In the dog groups, it was ensured that only a single dog-handler team was present for each synchronous Zoom or asynchronous prerecorded video session. To address participants who failed to attend their assigned session and to ensure consistency in the number of participants in each group, volunteer students from the B.A.R.K. program were assigned to groups to ensure a minimum number of 3 student attendees within each session (note: data was not collected on these substitute students).

The same dog-handler teams participated in both synchronous Zoom and asynchronous prerecorded video sessions, and handlers followed the same script across all conditions. The script was written to mirror conversation that typically unfolds within the context of in-person drop-in sessions offered as part of the B.A.R.K. program. In all four conditions, both synchronous Zoom and prerecorded asynchronous prerecorded video, handlers asked participants to reflect on how their classes and semester were unfolding. In the conditions with a therapy dog present, handlers also asked participants to imagine themselves getting to know and petting the therapy dog. In this way, the script and activities were comparable between the synchronous Zoom and asynchronous prerecorded video conditions, with and without a dog-handler team present. Further details regarding the training of dog-handler teams and the filming of asynchronous prerecorded sessions can be found by accessing the larger mixed-methods study from which the data for this research were drawn (Binfet et al., 2022).

Measures

Session Questionnaire. To capture participants' views regarding the virtual sessions, a 4-item questionnaire was developed. Using a 5-point Likert-type scale (1 = disagree strongly to 5 = agree strongly), participants were asked to rate their level

of agreement/disagreement: (1) "If I had the choice of attending sessions in-person or virtually, I would choose virtually"; (2) "The handler plays an important role in this process"; (3) "I wish the sessions were longer"; and (4) "I would participate in virtual sessions like this again." Participants also rated their engagement in the session ("How engaged were you over the course of this session?") and their connection to the handler ("How connected to the handler do you feel?") on a 5-point Likert scale (1 = not at all to 5 = very engaged/connected).

Experiences of the Session. Participants were asked to respond to three open-ended questions aimed at clarifying the impact of the sessions. These included: (1) "How did participating in this study make you feel?"; (2) "Was this intervention helpful? Yes/No"; and (3) "Why was the intervention helpful/not helpful?"

Data Analytic Procedure

Participants' responses to the 4-item questionnaire and to the question asking "Was this intervention helpful? Yes/No" were analyzed using chi-square tests and factorial ANOVAs in order to make comparisons as a function of the four conditions (i.e., synchronous Zoom with/without dog, and asynchronous prerecorded video with/without dog). Participants' open-ended responses (i.e., "How did participating in this study make you feel?" and "Why was the intervention helpful/not helpful?") were analyzed through qualitative content analysis, which is considered to be an appropriate approach when there is limited preexisting literature of the phenomenon at hand (Hsieh & Shannon, 2005). Additionally, this approach allows the data to be analyzed descriptively by coding the data and interpreting quantitative counts of codes (Vaismoradi et al., 2013).

Content analysis constitutes a multistep process, the first of which involves reading all the responses in a single session and identifying global themes. This phase was conducted by a team of three experienced researchers and resulted in the creation of a dynamic coding manual. Once this phase was completed, a more exhaustive analysis was conducted wherein the responses were read more closely and summarized into logical codes based on the key message found within text. These codes were subsequently winnowed to reduce redundancy (Wolcott, 1990).

Once these themes were identified and a coding manual was developed, a two-step process of analyzing the data both within-case and across-case was conducted. This allows for researchers to compare the commonalities, differences, and prevalence of salient themes both within participants and across all participants involved. Finally, a research assistant analyzed a randomly selected subset of 20% of the codes to establish intercoder agreement rates of 86.8% and 88.9% for questions 1 and 2, respectively. Where relevant, discordant codes were reconciled through discussion (see Tables 2 and 3 for the codes used for questions 1 and 2, respectively).

Results

Session Questionnaire: Comparisons by Condition

Helpfulness. Helpfulness was measured using a dichotomous (yes/no) item. Overall, 75% of the participants found the intervention to be helpful, with higher ratings of helpfulness in conditions including a dog (synchronous with dog: 82%, prerecorded video with dog: 84%, synchronous without dog: 69%, prerecorded video without dog: 67%). A three-way log likelihood analysis produced a final model that retained only the interaction between the dog variable (dog present vs. absent) and ratings of helpfulness (helpful vs. not helpful). A chi-square test with Yates's continuity correction found a significant association between dog presence and helpfulness, $\chi^2 = 13.7$, $p < .001$. The odds of a participant whose session included a dog finding the intervention helpful were 2.32 times higher than the odds of a participant whose session did not include a dog.

Other Variables. We used factorial ANOVA to assess the effect of dog presence and mode of delivery on other outcomes (see Table 4). We identified a

Table 2 Codes Related to the Question "How did participating in this study make you feel?"

Parent Theme	Theme	Examples
Positive responses	General	Better, better after hard week, uplifted, improved my mood, lifted my spirits, therapeutic, felt lighter, gained perseverance, brightened, encouraged, inspired, enthusiastic, interactive, engaged, alert, appreciative, grateful, nice, interested, light-hearted, boost in believing in myself, good, more confident in school, inspired, refreshing, content
	Comforted/ supported	Comforted, _____community cares about us, reassured, program was reassuring, comfortable, supported, nice to see _____cares, I felt safe, relieved knowing someone else cares
	Destress/calming	Calm, relaxed, less stressed, at peace, serene, weight off my shoulders, less irritable, an aspect of the program made me feel calmer, made me forget about my stressors, felt at ease
	Happy	Happy, made me smile, joy, excited, I could not stop smiling, an aspect of the session made me feel happier
	Optimistic	More optimistic, more positive about my future, more hopeful
	Felt welcomed/ included	Felt understood, heard, welcomed, included, accepted into community, the environment was friendly, felt like my feelings were valid, I felt I could answer more openly with the dog there
	Sense of community/ connection with others	Connected to others, connected to _____/Campus, found commonalities with others, good to see familiar faces, to know I'm not alone, to know others feel this way too, companionship, that it's normal to feel stressed, others are going through the same hardships, reassuring to know others are feeling the same, people I can relate to, I felt less alone
	Increased self-awareness	Reflective, more aware of my feelings, more attentive to current emotions, reflective on my well-being, made me grateful that I live locally, saying my responses out loud made me realize how I'm actually feeling, thought more about what I like about school, changed my perspective on school experience
	Interesting learning about dog/CAI	Learned about the _____program, interesting learning about the dog, informed about program
Neutral	Mood/feelings	Uneventful, all right, okay, fine, no effect on my mood, indifferent, I'm not sure
Negative feelings	General	Disconnected, confused, tired, pointless, made me miss seeing people in person, tired of being asked about how we feel over Zoom
	Anxious/stressed	Zoom felt forced, it was awkward, uncomfortable, stressed, anxious, stressed/anxious before participating, felt nervous talking to other people on the call
	Sad/disappointed	Sad, saddened, disappointed not to see dog, underwhelmed
Other	General	Emotional, distracted from stressors, hope to come back in person one day, session wasn't long enough, wish it was in-person, wish I saw the dog, now I want a dog
	Dog characteristics	Dog was relaxed, dog was cute, dog was calm, dog's fur looked really soft
	Handler characteristics	The handler had a calming voice, handler was kind, handler was sweet, the handler had a gentle presence

Table 3 Codes Related to the Question "Why was the intervention helpful/not helpful?"

Parent Theme	Theme	Examples
Helpful		
Social benefits	Human interaction	Good to talk to people other than family/roommates, nice to hear about others, interacting with peers and program volunteers, human interaction, nice to see friendly faces
	Connections to campus community	Connections to other students on campus, liked taking part in a school-based study, connected, connected to university, part of something, solidarity with students
Self-awareness/reflection		Live in the moment, regrounded, made me more aware of my fortunes, opportunity for self-reflection, put things into perspective, more connected to myself and my emotions, purpose in life, more self-aware of my feelings
Resource awareness		Even in a pandemic, there are resources available to me, I learned about resources, nice to know that there are things out there to help, new resource that I wasn't aware of, I could use this to help me, there's lots available at my university to support me, learned more about the dog therapy program, this program is a new way to cope with life
Dog/handler characteristics		People were nice, handler was nice and supportive, handler was kind, dog was calm, dogs are great, dogs are more caring than humans
Break		Nice break from school, chance to slow down, mental break from academics/ homework.
Positive impact on participants' mood	General	Boosted mood, uplifted, feel better, intervention helped me, more alert, more wholesome, more motivated, pleasant experience, therapeutic
	Stress reduction	Stress reducing, stress relief, less stressed, less anxious, feel calmer, feel less jittery, less nervous, relaxed, calm environment, soothed.
	Happy	Increased joyfulness, joy, happiness, added positivity to my day
	Less isolated	Less alone, reduced isolation, not alone anymore, less left out
	Comforted/reassured	Dog was comforting, someone willing to listen, good to talk to someone who wasn't expecting anything from me, safe space, safe environment, feel more comfortable, feel reassured by handler, felt the handlers' compassion
	More positive	More positive about college life, I looked on the positive side after the session, it changed my perspective on the campus and professors, I feel better about life/future
Other		Chance to interact with animals, novel, different from class life, grateful, dogs made it easier to talk, look forward to using these sessions in person, interesting, nice to see others adapting well
Not helpful		
No impact		Made no difference, it was fine, there's nothing new in talking to people, no impact, no change in my mood, expected more change in my mood, I already knew all of the information

(*Continued*)

Table 3 (*Continued*)

Parent Theme	Theme	Examples
Problem with the intervention session	Too short	Too short, intervention wasn't long enough
	No dog	Disappointed not to see a dog, sorry there was no dog, no dog = pointless
	Online format	Online format wasn't as helpful, couldn't pet the dog as virtual, struggling to make connections via Zoom
Negative impact on participants' mood	General	Felt like work, felt sad, disinterested or disconnected, no connection with others
	Anxious/stressed	Anxious about my future, stressful talking on a Zoom call, stressed due to social anxiety, felt nervous turning camera on
Other		Too much on my mind, couldn't relax, data useful for research, short-lived outcomes

Table 4 Means, Standard Deviations, Main and Interaction Effects for Each Study Condition across Each Item of the Session Questionnaire

	M (SD)						
Variable	Dog synch.	Dog pre-rec.	No dog synch.	No dog pre-rec.	*F*: Main effect of dog presence	*F*: Main effect of mode of delivery	F: Interaction
Virtual: "If I had the choice of attending sessions in person or virtually, I would choose virtually," 1 (strongly disagree) to 5 (strongly agree)[a]	1.68 (0.97)	1.73 (1.13)	2.32 (1.28)	2.13 (1.26)	21.67** η_p^2 = .04	1.31 η_p^2 = .003	0.50 η_p^2 = .001
Handler: "The handler plays an important role in this process," 1 (strongly disagree) to 5 (strongly agree)	4.23 (0.88)	3.85 (1.03)	3.91 (0.95)	3.85 (1.04)	2.81 η_p^2 < .001	5.81* η_p^2 = .01	3.08 η_p^2 < .001
Longer: "I wish the sessions were longer," 1 (strongly disagree) to 5 (strongly agree)	3.59 (1.18)	3.64 (1.03)	3.54 (1.09)	3.43 (1.04)	2.05 η_p^2 < .001	0.08 η_p^2 < .001	0.84 η_p^2 < .001
Again: "I would participate in a virtual session like this again," 1 (strongly disagree) to 5 (strongly agree)	3.41 (1.30)	3.62 (1.24)	3.60 (1.26)	3.57 (1.33)	1.67 η_p^2 < .001	0.93 η_p^2 < .001	0.64 η_p^2 < .001
Engaged: "How engaged were you over the course of the session?" 1 (not at all) to 5 (very engaged)	4.08 (1.06)	3.92 (0.93)	3.97 (1.03)	3.85 (1.01)	1.05 η_p^2 < .001	2.17 η_p^2 < .001	0.04 η_p^2 < .001
Connected: "How connected to the handler did you feel?" 1 (not at all) to 5 (very connected)	3.51 (0.98)	3.25 (1.10)	3.17 (1.05)	3.26 (1.18)	3.17 η_p^2 < .001	0.88 η_p^2 < .001	3.31 η_p^2 < .001

*p < .05; **p < .01.

[a] Trimmed means used to deal with a violation of the assumption of homogeneity of variance.

All *F*-statistics have degrees of freedom (1, 426).

significant main effect of dog presence on preference for a virtual session, such that participants in conditions with dogs were less likely to prefer a virtual session. We also found a main effect of mode of delivery on perceptions of the handler's importance, such that participants in synchronous sessions viewed the handler as more important. No other main effects or interactions were significant.

Experiences of the Session: Comparisons by Condition

Question 1: How did participating make you feel? A total of 739 codes emerged from 465 responses to this question. Each response was, on average, 30 words long and a total of 13,728 words were analyzed. Overall, participants reported feeling positive about having participated in this study, with 72.4% of all codes reflecting a positive valence. Negative feelings comprised 15.4% of all codes and neutral responses 12.2%. Across all conditions, analysis revealed that the three most prevalent codes that emerged from participants' responses were *Positive—General* (17.2%), *Destress/Calming* (16.6%), and *Community/Connection* (11.9%). When the salient codes were compared across synchronous versus asynchronous conditions with a dog present, differences in the prevalent codes emerged.

Participants in the prerecorded group with a dog present were the most likely to report that the intervention was *destressing or calming* (31.5%) and cited examples such as "I feel a bit more at ease because it reminded me of sitting at home and studying with my dog at home in my lap. It helped take my mind off of all the stress I'm harboring right now" (Participant 423) and "It relaxed me to be able to chat with the handler (even if it was just via a YouTube video)" (Participant 114). *Positive—General*, which was defined as a positive feeling but that could not be categorized into highly prevalent themes, included examples such as "The questions in the video helped me to feel grounded" (Participant 65) and "The video gave me a sense of security" (Participant 376) and comprised 17.9% of codes in this group. This was followed by *happiness*, which accounted for 14.1% of the codes and included examples such as "It made me happy right away to see the dog all happy and fluffy" (Participant 18). It is worth noting that 5.4% of codes indicated a *neutral* comment regarding the helpfulness of the intervention (e.g., "Dogs are cute" (Participant 269) and "I want to get to know the _____ program and how to participate" (Participant 204), and 4.6% of codes indicated that the participants felt *sad or disappointed* in some way. The same percentage reported feeling *comforted/supported* by the intervention.

The most prevalent theme that emerged from responses of participants in the synchronous condition with a dog was a sense of *destressing or calming* (16.9%), closely followed by a sense of *happiness* (16.3%). Participants in this group described the session as destressing or calming because "the dog in the video looked peaceful and serene" (Participant 441) and said "watching someone else petting the dog was calming" (Participant 297). Notably, *happiness* was most prevalent in the synchronous condition with a dog-handler team when compared with the prerecorded with a dog condition (14.1%). This sense of happiness or joy reported by participants in the synchronous with a dog condition is illustrated by the following quotations: "After ending the call I felt more joyous and made me want to stay on the call because it made me feel happier" (Participant 234) and "It made me feel awesome, just looking at Dash put a smile on my face" (Participant 25). A sense of *community/connection* comprised 13.6% of codes in this group, which made this theme the third most prevalent within this condition. Responses categorized in this theme shared a common sense of building relationships or connections with fellow students, the university community, and/or the program staff. The essence of this theme is illustrated in the following example from Participant 48: "[The session] made me feel more connected to students, the handler, and the dog, which I really enjoyed. Even though I have zoom calls for some of my classes, they are not that interactive, nor do I even see anyone's face usually." Within this condition the theme of feeling *comforted/supported* emerged as the fourth most prevalent theme (7.1%). These participants felt that the session had provided them with feelings of

reassurance, support, or comfort, as is demonstrated by the following quotation:

> This study makes me feel that there are staff at the university that really do care about the physical and mental health of [the university] students and that since the pandemic is affecting every individual, knowing we are all in this together is a comforting feeling." (Participant 141)

Other participants identified a sense of comfort derived from sharing similar feelings about their learning context as is evident here: "It was very comforting to know that other students were feeling similar about online schooling and the challenges that come along with it" (Participant 296). Notably, this sense of feeling *comforted/supported* was most likely to be identified in the synchronous condition with a dog compared to the prerecorded condition with dog (4.5%). *Neutral* feelings toward the intervention comprised 5.4% of the codes within the synchronous condition with a dog, making this the fifth most prevalent code in this group.

Question 2: Why was the intervention helpful/not helpful? Recall that participants were asked to indicate whether the session was helpful for them or not, which revealed that 75% of participants deemed it as *helpful*. They were then asked to explain their reason for their choice and each response was coded for primary and, where applicable, secondary codes. A total of 660 codes emerged from the participants' responses; 468 (70.9%) were positive in nature, 159 (24.1%) were negative in nature, and 33 (5.0%) were neutral. When the salient codes were compared across synchronous versus asynchronous conditions with a dog present, differences in the prevalent codes emerged.

Why Was the Intervention Helpful? Participants in the prerecorded group with a dog present were most likely to report positive comments (76.9%) in their explanations. Within this group, 60% of the codes indicated that participants found the session helpful because it boosted their *well-being* in some way. The most common response within this code was that the session had *reduced participants' stress* (23% of all positive codes within this group). Notably, the stress-reduction aspect was more frequently reported in this condition as compared to the synchronous condition with a dog present. Participants cited examples such as "I was quite surprised by how much the dog's presence calmed my mind and spirit" (Participant 127), "I feel more at ease and more relaxed" (Participant 212), and "I was calmed by the dog on the screen" (Participant 229). Other notable well-being benefits included a *general sense of improved well-being* (13.85%) and feeling *happier* (12.31%), such as: "Even watching people patting their pets brings me joy" (Participant 239) and "Seeing a dog brightened my day" (Participant 274). In addition to reporting well-being benefits, participants who viewed a prerecorded video with a dog also reported finding the session *generally helpful* (13.1%) or that the session gave an opportunity to *self-reflect or gain self-awareness* (10.0%). The majority (69.2%) of those who identified this theme specifically identified the session as providing a chance for *reflection*. The form of reflection varied among participants. Some found it helpful to reflect in general, such as: "It was helpful because it got me to reflect" (Participant 5). Others specifically mentioned reflecting on their mental health, for example: "This session helped me to stop for a second and reflect on how I am feeling and my mental health for a moment" (Participant 220) and "I actually thought out responses for the questions asked in the video. It was nice to reflect and, in a way, do a self-check-up" (Participant 42). Others identified the session as "helpful to sit and reflect on some of the things that I think I've pushed to the back of my mind lately" (Participant 423).

Participants in the synchronous group with a dog present were the second most likely to report positive comments in their explanations (74.0%). Within this group, *well-being benefits* remained the most commonly reported reason for the intervention being helpful (54.9% of positive comments). Much like the prerecorded group with a dog, the benefits in stress reduction and improved happiness were the most commonly reported well-being benefits (18.8% and

10.9%, respectively). Participants cited examples such as "I had a nerve-wracking experience at work last night and an assignment due this morning, so I've been a little stressed for the last day or so, and seeing a dog made me feel better about everything that happened" (Participant 72), "It brought some happiness and light into my day" (Participant 155), and "It gave me a renewed sense of joy" (Participant 195). Evident in participants' comments in this group was the perception of sharing a *common experience* with other students or feeling in a similar way about their present situation (7.0% of positive codes, 12.9% of *well-being benefits*). Participants reported feeling better knowing that they were going through the same experience as others, including this quote from Participant 184: "It gave me clarity and comfort knowing that I am not the only one facing serious motivation struggles with the new online format." Others reported feeling better knowing other students, or more senior students, were using similar well-being strategies to cope, such as: "It was nice to know others felt the same way about how to cope with stress" (Participants 408). In addition to *well-being benefits*, participants in this condition reported *social benefits* (22.7%) that arose from participating, including having *human interaction* (15.6%) and developing *connections* (7.0%) with other students or their campus community as a whole.

Further, between the groups with a dog present and those without a dog present, a distinction emerged for participants' self-reported well-being. The well-being theme was evident for 43.3% of the participants in the groups with a dog present and for 28.0% of those in the groups without the dog present. Within this parent theme, the participants' responses indicated that the main differences between the groups were related to reports of *happiness* (8.8% with dog, 0.9% without dog), *stress-reduction* (15.8% with dog, 7.6% without dog), and *general well-being* (7.6% with dog, 3.1% without dog). In addition, participants in the groups without a dog present were more likely to report having the opportunity to *reflect or gain self-awareness* (9.1%) compared to those without a dog present (4.4%). Finally, participants in the groups with and without a dog present equally cited the online format and the intervention being shorter than desired as reasons for why they found the intervention to be not helpful.

Discussion and Implications

The findings of this study advance our understanding of human-animal interactions within a virtual context and contribute to the emerging body of empirical research investigating how in-person opportunities to interact with animals may be adapted for our ever-changing virtual world. Young people, especially university students, are increasingly living in technology-saturated environments and this tech-heavy context might reduce opportunities for students to interact, in person, with live animals. Our research responds to the need to incorporate animals into the virtual world of students and to offer low-barrier and accessible stress-reduction opportunities via virtual canine comfort modules. Our findings illuminate our understanding of how these opportunities might be structured and the views of students who engage in virtual human-animal interactions.

Limitations and Future Directions

A unique feature of this study lies in the random assignment of participants to four different online conditions (with and without dog presence and synchronous versus asynchronous engagement). In this regard, other strengths include having handlers follow a script to ensure consistency across conditions, the use of both Likert-type ratings and open-ended prompts to capture participants' perceptions, and establishing intercoder agreement when identifying the salient themes in participants' responses.

Despite best intentions, this study is not without limitations. First, unlike when in-person, on-campus CAIs are offered, participants in our study were unable to choose their dog-handler. This might have impacted students' engagement in sessions. Second, the views, insights, and perceptions of students were gathered via rating statements and open-ended prompts. Possibly, semistructured interviews might

have more fully captured participants' lived experiences around virtual canine comfort. Semistructured interviews could also be used to explore how aspects of companion animal ownership and/or attachment might be related to people's experiences in virtual CAIs. Third, while this study's aim was precisely to unpack students' subjective insights using self-report measures, moving forward, research is needed that uses standardized measures and physiological recordings to support self-report findings. Fourth, our intervention format was comprised of limited synchronous and asynchronous options. It is possible that offering varied platforms or avenues (e.g., varied social media options) might provide engagement opportunities more reflective of the virtual consumer habits of university students. Fifth, it is possible that participants in the dog sessions reported them as more helpful because people who enjoy dogs were more likely to participate in this study. We acknowledge this potential expectancy effect and study limitation. Still, we note that our study participants were randomly assigned to one of four conditions and that, as anticipated, our study results revealed important nuances in participants' experiences across these conditions. We believe that participants' insights will inform the future design of successful virtual CAIs for postsecondary students. Last, it is possible that our study findings are situation-specific and do not hold up as strongly once people resume in-person social interactions. Future research should examine whether virtual CAIs will appeal to people beyond the current COVID-19 pandemic when in-person interactions resume. We submit that virtual CAIs will be especially appealing for some people even when in-person CAIs are available once again. For instance, virtual CAIs might appeal to people living in geographically remote areas or people who have communication, mobility, or mental health challenges, which often prevent them or make it difficult for them to access and benefit from in-person CAIs. Relatedly, for the purposes of our study we used a convenience sample of university students, and future research is needed with diverse groups of people to determine the generalizability of our results.

Summary for Practitioners

One of the key findings to emerge from our study was that participants in sessions with dogs (whether synchronous or asynchronous) were significantly more likely to find the session helpful than those in sessions without dogs. This effect was small to moderate, with 83% of those in sessions with dogs finding the session helpful compared to 68% of those in sessions without dogs. There was no significant effect of mode of delivery or interaction between dog presence and mode of delivery. This finding helps isolate the important role therapy dogs themselves play in fostering well-being over and above the mode of delivery and conditions in which only a handler was present. Additionally, our findings illustrate the versatility of therapy dogs who are able to offer support within a uniquely virtual context.

Participants in synchronous sessions in which a therapy dog was present shared that they were less stressed, anxious, and apprehensive. Might the presence of the therapy dog have rendered participants more open to connecting with their fellow participants, making favorable impressions of others, and thereby fostering a sense of community—that they were not alone and shared commonalities? In this regard, the therapy dog may act as a social catalyst, helping to unite participants virtually. Notably, this sense of feeling *comforted/supported* was most likely to be identified in the synchronous condition with a dog compared to the asynchronous condition with a dog. In terms of practice and education in the field of human-animal interactions, our findings suggest that students might be drawn to virtual CAIs as a way to promote group or collaborative activities (Fernandes et al., 2021). In keeping with our study aim to unpack students' subjective insights and experiences within a virtual context, we did not aim to directly compare virtual and in-person contexts. However, drawing on our study results we suggest that, in addition to offering in-person CAIs, human-animal practitioners and educators might consider virtual program delivery, which is often a more feasible, accessible, and cost-effective way to engage students with a diversity of animals across multiple contexts.

Added to this, our intervention design requiring participants to always show their face during sessions (versus turning their camera off as is commonplace during typical virtual sessions for university students), likely helped foster this sense of community. Participants shared that they typically turn their camera off during synchronous virtual sessions as part of their routine online coursework. For example, Participant 354 explained it as "I felt a little nervous being in the zoom call with people answering questions and showing my face I usually have my camera off." It could be that students turn their camera off to reduce their anxiety; however, showing their face could increase their engagement within sessions and afford opportunities to connect with other students within their session, thereby creating this sense of community noted by participants. Once again, human-animal practitioners and educators might consider virtual program delivery as a way to engage students while reducing anxiety and to foster group cohesion, collaboration, and learning.

We recognize that credit is not due uniquely to the therapy dogs. Undergirding the role of the therapy dogs are handlers who play a key role in fostering or facilitating well-being benefits in participants. Collectively, our findings suggest that the therapy dog and the handler help facilitate a sense of community within sessions, and participants in our study noted this. Certainly, the role of the handler is underinvestigated in the field of CAIs as emphasis is often placed on assessing the impact of sessions on varied outcome variables. Consistent with our study findings, Dell and colleagues (2021) discuss the training or skills of the dog handler and how these factors might impact the delivery of the CAIs and the subsequent engagement of participants within sessions. The role of the handler both in person and within virtual contexts has received limited empirical attention generally in CAI research, and additional research is required to more fully comprehend the skills these individuals bring to sessions and how they contribute to the well-being of participants.

Finally, it is worth noting that in our study the participants in the asynchronous session with a dog present still reported well-being benefits, but seemingly for different reasons. Specifically, the participants shared that the prerecorded sessions with a dog allowed them to be more mindful and to reflect in a quiet space about the things that mattered to them. These findings attest to the notion that participants may respond and engage differently to virtual canine comfort modules for different reasons. Therefore, alongside strategies to engage students in mindfulness practice to reduce stress, educators might consider incorporating virtual opportunities for students to engage with dogs, both individually in prerecorded sessions and as part of a group in synchronous sessions.

On a final note, our findings hold implications for animal welfare and suggest that, when canine welfare is a concern, practitioners and educators in the field of human-animal interactions could consider opportunities to interact virtually with dogs to support student well-being. The virtual context is an unobtrusive space where dogs can be engaged without intrusion and where their welfare can be respected. In this study, virtual canine comfort sessions were monitored by a trained research assistant for therapy dog welfare and signs of distress. We note that human-animal practitioners and educators must also consider the possibility that therapy dog welfare is compromised in some virtual contexts wherein handlers might not be required to meet the standards required by the therapy dog organization for in-person contexts. Our findings are well aligned with an increasing focus on animal welfare concerns within the field of human-animal interactions research and practice (Mellor, 2017; Mellor et al., 2020; Ng et al., 2015).

Conclusion

Rapid developments in technology represent exciting opportunities for researchers and educators who are interested in harnessing the benefits of virtual CAIs to support university students' learning and well-being. This research builds on the results of in-person CAIs by capturing the perceptions and views of university students in response to participation in a virtual CAI. In this way, our research extends our

understanding of how students might be supported by therapy dogs within a virtual context. Our study results can meaningfully inform the development of future successful virtual CAIs that hold the promise to positively impact the well-being of participants. As postsecondary administrators and student support service offices seek ways to reduce stress and anxiety and reassure students that they are not alone and that they share similar experiences with other students, our research adds to the emerging empirical evidence attesting to the positive reception of virtual CAIs by university students. It is one thing for interventions to work, but they must also be well received by the participants—certainly if they are to be repeatedly accessed as is the case for stress-reduction initiatives.

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Appendix A

Handler Script

The following script will be used by handlers to guide their dialogue whether they participate in either synchronous (i.e., Zoom or Livestream) or asynchronous (i.e., pre-recorded) sessions.

Welcome to a Virtual Canine Comfort session offered by the University of British Columbia called B.A.R.K.

I am a B.A.R.K. *program handler and my name is* _____. *My therapy dog is* _____.

Let me explain what will happen over the next 5 minutes we're together. First, I will introduce my dog to you and I will ask you questions to engage you in today's session, similar to what I might ask if you attended an in-person session on-campus.

Let's begin.

Let me introduce you to my therapy dog. His/her name is _____. *As you can see, he/she is a* _____ *(identify breed). He/she is* _____ *years old.*

Handler then describes the dog's background including how the dog joined the handler's family, how long the dog has worked in the B.A.R.K. program, and the dog's personality (e.g., likes/dislikes).

Now, I'm going to ask you to reflect on how you're doing. We know that being a university student can be a stressful experience. Added to this, you've had to adapt to a virtual or online learning context and that potentially has added stress to your situation.

As I ask you these questions, think about your responses and the motivation behind your choices. Also, as you reflect on these questions, I want you to imagine yourself petting _____ *(insert dog's name) and getting to know* _____ *(insert dog's name) even though you may be far away from campus.*

1. *What brought you to participate in this study?*
2. *How are you finding your classes this semester?*
3. *What are your favorite classes, and why?*
4. *What activities have you enjoyed participating in recently?*

I hope you enjoyed today's session and remember, should you be feeling overwhelmed, you can reach out to your professors and instructors for academic support and you can access the resources available through the University of British Columbia's Student Services and Wellness Centre. You have a resource here too in the B.A.R.K. Virtual Canine Comfort modules that will be posted on the University of British Columbia's website and the B.A.R.K. website once the study is completed. You may visit these modules anytime you like and as often as you like.

You have one job left, to help us understand the impact of a session like this on students, please return to the survey tool and complete your post-test survey. We would also really appreciate it if you could leave a comment in the comment section indicating how this session impacted you and how it made you feel. Thank you!