

THE EFFECTS OF ANIMAL-ASSISTED ACTIVITIES (AAA) ON THE WELL-BEING OF MINORITY STUDENTS IN GERMANY
LES EFFETS DES ACTIVITÉS ASSISTÉES PAR L'ANIMAL (AAA) SUR LE BIEN-ÊTRE D'ÉLÈVES ISSUS DE LA MINORITÉ EN ALLEMAGNE

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Volume 54, Number 3, Fall 2019

URI: <https://id.erudit.org/iderudit/1069765ar>
DOI: <https://doi.org/10.7202/1069765ar>

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Publisher(s)

Faculty of Education, McGill University

ISSN

1916-0666 (digital)

[Explore this journal](#)

Cite this article

Sokal, L. & Kahl, A. (2019). THE EFFECTS OF ANIMAL-ASSISTED ACTIVITIES (AAA) ON THE WELL-BEING OF MINORITY STUDENTS IN GERMANY. *McGill Journal of Education / Revue des sciences de l'éducation de McGill*, 54(3), 464–478. <https://doi.org/10.7202/1069765ar>

Article abstract

Global increases in mental illness in children and youth have precipitated a wide range of therapies to address this concern. An alternative to this reactive approach is based on models of mental wellness that enhance children's and youths' perceptions of well-being and health. The current project examined the effects of a universal animal-assisted activity (AAA) program on a group of minority students who attended a boarding school in Germany. The intent of the current study was to determine whether the duration and types of AAA the students experienced were associated with higher levels of perceived mental well-being. Short-term gains in calmness were demonstrated under some AAA conditions, and long-term gains in well-being resulted from minority children's participation in rabbit club.

THE EFFECTS OF ANIMAL-ASSISTED ACTIVITIES (AAA) ON THE WELL-BEING OF MINORITY STUDENTS IN GERMANY

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ABSTRACT. Global increases in mental illness in children and youth have precipitated a wide range of therapies to address this concern. An alternative to this reactive approach is based on models of mental wellness that enhance children's and youths' perceptions of well-being and health. The current project examined the effects of a universal animal-assisted activity (AAA) program on a group of minority students who attended a boarding school in Germany. The intent of the current study was to determine whether the duration and types of AAA the students experienced were associated with higher levels of perceived mental well-being. Short-term gains in calmness were demonstrated under some AAA conditions, and long-term gains in well-being resulted from minority children's participation in rabbit club.

**LES EFFETS DES ACTIVITÉS ASSISTÉES PAR L'ANIMAL (AAA) SUR LE BIEN-ÊTRE D'ÉLÈVES
ISSUS DE LA MINORITÉ EN ALLEMAGNE**

RÉSUMÉ. L'augmentation mondiale des problèmes de santé mentale chez les enfants et les jeunes a provoqué l'apparition d'un éventail de thérapies s'attaquant à ces enjeux. Une solution alternative à ces approches réactives est basée sur des modèles de bien-être mental qui améliorent la perception qu'ont les enfants et les jeunes du bien-être et de la santé. Notre projet s'est attardé aux effets d'un programme universel d'activités assistées par l'animal (AAA) sur un groupe d'élèves issus d'une minorité et pensionnaires d'un établissement scolaire allemand. L'objectif de ce projet de recherche était de valider si la durée et le type d'AAA vécues par les élèves avaient un lien avec des niveaux de bien-être psychologique perçus plus élevés. À court terme, une augmentation du calme a été observée sous certaines conditions de AAA et à long terme, des progrès ont été constatés en terme de bien-être chez les participants du *Rabbit Club*.

Global increases in mental illness in children and youth have sounded alarm bells in schools worldwide, precipitating a wide range of therapies to address this concern. An alternative to this reactive approach is based on models of mental wellness that not only prevent mental illness, but also enhance children's and youths' perceptions of well-being and health. The current project examined

the effects of one such approach – a universal animal-assisted activity (AAA) program – on the mental health and well-being of a group of Islamic minority students who attended school in Germany. Like Germany, who has welcomed more than 1.4 million Syrian refugees, Canada has recently welcomed 45,000 refugees from Syria, and both countries are looking for ways to smooth the transition for students who must now learn in a new language and culture. Understanding the social-emotional effects of school-based programs involving animals will shed light on the possible effects within school communities that include newcomers, especially those emigrating from Islamic countries.

LITERATURE REVIEW

Mental Health in Minority Populations

The prevalence in mental illness world-wide is alarming. For example, it was reported that 27% of the adult population of the European Union countries had experienced a mental disorder in the past year, with over 83,000,000 people affected (World Health Organization [WHO], 2017). These mental health statistics mirror those of children and youth, and recent research has shown that these numbers are growing (Mojtabai, Olfson, & Han, 2016). Likewise, in Canada the prevalence of mental health issues in children are of concern, with conservative estimates showing approximately 14% of children aged 4-17 experience mental health disorders (Waddell, 2007). Moreover, the literature presents a convergence of evidence showing migrants experience higher levels of mental illness than those born in the countries to which they emigrate (Every, Smith, Trigg, & Thompson, 2017). For example, Turkish migrants who emigrated to Norway as labourers expressed more internalizing problems than did native-born Norwegians (Virta, Sam, & Westin, 2004). In contrast, the research about the mental health of the children of immigrants is inconclusive (Stevens & Vollebergh, 2008). Turkish immigrants to the Netherlands reported a higher incidence of both internalizing and externalizing behaviours in their children than did Turkish parents who remained with their children in Turkey (Bengi-Arslan, Verhulst, Ende van der, & Erol, 1997). Similarly, Jäkel, Leyendecker, and Agache (2014) showed that the mothers of Turkish immigrant children in Germany rated their children's emotional and peer problems as more severe than did German-born parents of their children. However, teachers of these two groups of children noted no significant differences, suggesting that more research is needed in order to understand this phenomenon. Indeed, one of the WHO's (2013) objectives is to implement strategies for promotion and prevention related to mental health, and this objective applies to school children as well as adults. Together, these findings suggest that while mental health diagnoses are on the rise in children and youth worldwide and more common in migrant adults, little is known about the mental health of migrant children.

Benefits of the Human-Animal Relationship

The literature is not consistent in its terminology regarding human-animal interactions. For the purposes of this paper, we will differentiate between pet-human relationships, animal assisted therapies (AAT), and animal-assisted activities (AAA), with the last serving as the program under examination in the current study.

Copious research has supported the physical and psychological benefits of pet ownership on human well-being (Allen, Blascovich, & Mendes, 2002; Charnetsky, Riggers, & Brennen, 2004; Friedman & Thomas, 1995; Friedmann & Tsai, 2006; Virues-Ortega & Buela-Casals, 2006; Walsh, 2009). Moreover, Melson (2003) showed that children with pets demonstrated enhanced empathy, self-esteem, and greater cognitive development.

Given the benefits of pet ownership, therapies were developed in an attempt to harness some of the positive effects on humans; AAT is a specific approach used by some therapists whereby an animal is used in therapy sessions to build rapport, enhance the therapeutic process, and facilitate achievement of the therapy goals (Walsh, 2009). Studies have been conducted about AAT using dogs, cats, dolphins, horses, rabbits, cows, birds, ferrets, and guinea pigs (Kamioka et al., 2014). Its effects have been empirically supported, especially among children (Jenkins, Laux, Ritchie, & Tucker-Gail, 2014). Furthermore, these findings extend to minority populations: Every et al. (2017) showed that therapists using animal-based therapies with refugee children noted that the children demonstrated calmer, more focused, and less aggressive behaviours in the presence of the therapy animals. Additionally, these children showed greater affiliation and communication, greater positive emotions, and through caring for the animals, the children learned responsibility, caring, and developed confidence. Despite the burgeoning research base supporting the positive effects of animal contact on human beings, little evidence of their use in practice is currently found (Walsh, 2009). Two meta-analyses have been conducted that support the benefits of therapies that utilize animals, including small effect sizes on emotional well-being (Nimer & Lundahl, 2007) and medium effect sizes on depression (Souter & Miller, 2007). It should be noted that Nimer and Lundahl's study did not require a control group in the inclusion criteria, and that Souter and Miller's study included only five studies that met their high inclusion standards of a control group and random assignment in studies of the effects of animals on depression.

Animal-assisted activity (AAA)

AAAs "provide opportunities for motivational, educational, recreational, and/or therapeutic benefits for optimal recovery and functioning, positive development, and enhanced quality of life" (Walsh, 2009, p. 474). AAA should not be confused with AAT, as they differ in several significant ways. AAA is much

less formal than AAT and is more focused on connection (Granger & Kogan, 2010). While AAT is used to facilitate achievement of therapy goals within a patient in a clinical setting under the supervision and monitoring of a therapist or clinician, AAA need not involve a therapist, nor specific diagnoses or therapy goals (Friesen, 2010). AAA is instead an approach that seeks to enhance mental well-being and does not pre-assume a clinical diagnosis within the person involved in AAA. Instead, this approach harnesses the positive results associated with human-animal contact in order to enhance the outcomes for the participants. One goal of AAA is to decrease isolation and loneliness of children in school settings, and Kotrschal and Ortbauer (2003) showed that the presence of a dog in a school setting could decrease the social isolation perceived by students there. Other researchers found that introducing a dog into a classroom setting also resulted in fewer behaviour problems (Hergovich, Monshi, Semmler, & Zieglmayer, 2002). Although some of the participants in AAA programs may have clinical diagnoses or problematic behaviours, use of AAA is intended to be proactive rather than reactive in building mental wellness and resiliency universally in children and youth.

Despite the overall positive support for AAT and AAA presented in the research, there remain some reservations about these approaches. Zilcha-Mano, Mikulincer, and Shaver (2011) questioned whether individuals involved in AAA can form the same sorts of bonds in these settings as pet owners have formed with their animals. They pointed to the time-limited nature of the AAA human-animal relationship as a possible barrier to individuals realizing the “full-blown attachment relationship” with the AAA animals, and posited that the accompanying benefits may also be weaker. Alternatively, Handlin, Nilsson, Ejdeback, Hydring-Sandberg, and Uvnas-Moberg (2012) hypothesized that one of the benefits of AAA comes from touch. That is, oxytocin, a chemical associated with feelings of calmness, happiness, and peace, is produced as a result of touching and petting an animal. If this is the case, the a “full-blown” relationship is not a requirement to experience at least some of the benefits of AAA.

In addition to concerns about effects of pet-ownership being over-generalized to other sorts of human-animal interactions, and a lack of understanding of the mechanisms by which effects are generated (Crossman, 2017), concerns about research quality have been raised. Despite the copious number of research studies about the effects of animals on humans in each type of human-animal relationship, both qualitative and quantitative studies continue to suffer from quality limitations. Indeed, in examining meta-analytic studies about the effects of human-animal interaction (e.g. Souter & Miller, 2007), we noted that many studies were excluded due to not meeting criteria for quality as determined by the researchers. Common issues with quantitative research include small sample sizes, handler effects, lack of a control groups, and inadequate descriptions of the treatments, therefore prevented classifying programs as AAT or AAA (Crossman, 2017; Stern & Chur-Hansen, 2013). In qualitative research about

human-animal programming, similar limitations are that researchers fail to determine the influence of the participant's attitudes toward animals and also fail to describe how the positioning of the researcher during interviews might introduce bias into the study (Stern & Chur-Hansen, 2013). Although studies such as those conducted by Binfet (2017) and Binfet and Passmore (2016) meet the gold standard of both random assignment and control group design, these studies are rare. Considered together, these limitations provoke less certainty about previous findings related to human-animal interaction studies.

THEORETICAL BASIS

Current models of mental health consider not only responses to mental illness, but also stress the importance of strategies that foster mental wellness and prevent mental illness. One such model is the Keyes model (2002), which conceptualizes mental health along two intersecting continua, therefore creating four quadrants of health. In one quadrant we find children who have diagnosed mental illness that is either untreated or not treated in effective ways. Children in this quadrant are said to be "languishing." In the second quadrant, we find children with diagnosed mental illness who are being treated appropriately and are managing their illness well. These children are said to be "flourishing." The third quadrant represents children with no diagnosis of mental illness who are not reaching their potential or engaged in their daily lives in meaningful, fulfilling ways. These children are recognized as "languishing." Finally, we have the majority of children – those who have no mental health diagnoses and are living happy, fulfilling lives. These children are said to be "flourishing." The key message of the Keyes model is that a diagnosis of mental illness is not a sentence of an unhappy, unproductive life, just as having no diagnosis does not guarantee a happy and productive life. Keyes' model shows understanding of a key principle of the Constitution of the WHO, which states that "health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." (WHO, 1948). Just as is the case with physical health and its requirements for nutritious food, sleep, and exercise, fostering mental health also takes effort and focus. One of the keys to mental wellness is being involved in healthy relationships.

Bowlby (1973, 1980, 1982) proposed that human attachment is foundational to human health. Individuals who have formed relationships with supportive figures who are available in times of need develop a strong sense of attachment, as well as working models of relationships associated with adaptive psycho-social functioning, and positive mental health (Zilcha-Mano, Mikulincer, & Shaver, 2011). Bowlby's theories of attachment have received long-term and wide-spread support in the literature. As previously discussed, human-animal bonds also provide positive physical and mental health benefits. Zilcha-Mano et al. (2011) further suggested that pets can serve many of the same functions as human beings in terms of attachment bonds.

A UNIQUE SETTING AND OPPORTUNITY

The study school is a grade 5-12, dual-track boarding school in Germany where German students of mainly Turkish, Muslim backgrounds attend alongside peers of German origin in order to experience cultural acceptance and fair educational opportunities. In Germany, students are streamed into either university-entrance or vocational-entrance programs on the recommendations of their teachers at the end of fourth grade. Students of Turkish heritage in Germany are streamed into vocational programs at a disproportionate rate, and they have lower educational achievement compared to other German students (Kristin & Granato, 2007; Sohn & Ozcan, 2007). The mission statement of the study school therefore includes an overt social justice and inter-cultural mandate intended to address this trend.

The setting of this school offered a unique opportunity to address many of the questions raised in previous research about AAA, mental health, and children of migrants. Despite the growing and convincing data base, most studies have been conducted on clinical populations, and few have included non-Western settings or culturally diverse samples (Chur-Hansen, McArthur, Winefield, Hanieh, & Hazel, 2014). Specifically, Jäkel, Leyendecker, and Agache (2014) showed that little is known about the mental health of children of Turkish immigrants, who make up the largest immigrant group in Germany, and urged more research on this population. Every et al. (2017) noted that researchers who study the effects of AAT or AAA on Muslim children may want to consider whether the particular children involved in the study will be receptive to the type of therapy animal selected. He, as well as others (Friesen, 2010), caution that participants who immigrated from Islamic countries may not welcome a dog into the therapeutic setting, therefore opening the door to studies that supplement AAA studies, most of which involve dogs. The current research therefore fills the lacuna in the research literature in that it explores the effects of AAA on a non-clinical sample of migrant children of Turkish heritage in a school setting and uses animals other than dogs in the treatment group.

RESEARCH QUESTIONS

Our research questions were as follows:

Do children's perceived life satisfaction, perceived happiness, or perceived calmness differ significantly before and after their visits the animals?

Do the children's activities during the visit (petting rabbits versus not petting rabbits) differentially affect the pre-visit to post-visit changes in life satisfaction, perceived happiness, or perceived calmness?

Do children's scores on self-regulation, social cohesion, social support, and overall well-being differ significantly before and after a 13-week program with the animals?

METHODS

Design and Participants

The study took place over 13 weeks and included thrice-weekly sessions where 13 children in grades 5 to 9 interacted with the rabbits. In fact, each student at the school was required to select one after-school club. The participants in our study chose the rabbit club over other clubs on offer by the school such as the dog club and various sports clubs. In the rabbit club, students took part in a set sequence of events in each session, all supervised by a teacher from the school who was not the classroom teacher of any of the children. At each visit, the students met first in the classroom as a group. They filled out inventories individually, then they gathered the equipment and filled a water bowl for the rabbits. The children then went outside to gather food such as grass and dandelions. Before the children entered the 3 X 3 metre enclosure, the teacher reminded them about acting respectfully towards the five rabbits, sitting quietly on their mats and waiting for the rabbits to come from their hutches to eat the food offered by the children. The children were not to run, chase, or grab the rabbits. At all visits, the rabbits were fed and petted *only* if they came to the children. At some visits, the enclosure and hutches were cleaned as well. After each visit, the children returned to the classroom to individually fill in the inventories again.

The control group consisted of 13 matched children who participated in a dog club. Dog club participation was also done by self-nomination and operated using the same inventories set up in the rabbit club, with the exception that there was only one dog – a border collie named Forest. The same teacher, again not the classroom teacher of any of the participants, ran the club. Rather than going into the hutch, as with the rabbit program, that portion of the program involved walking with and playing with Forest outside on the grass. All other aspects remained consistent with the rabbit club.

Being as the rabbit club was a new program at the school, and based on our concern about not over-stressing the animals, the student participants began the program with a staggered start. The first group of 8 students included 6 younger students (aged 11, including 3 females and 3 males) and 2 older male students (age 14 and 15). The 2 older boys, who assisted their teacher with running the program, left the project after 9 weeks due to other demands at school. One 11-year old female also left the program at that time due to out-of-school commitments, although 5 students were added – a 10-year-old female, three 11-year-olds (2 females and a male), and a 12-year-old male. In total, 13 students participated in the study. All were self-nominated and the second wave left their former after-school programs to join rabbit club. Of these students, 8 were Turkish-Germans, 4 were Turkish, and 1 was Russian-German.

Data were collected by survey, observation, and interview. The surveys were completed by the children in both groups each week while supervised by the

teacher. Observations were completed when the primary investigator visited mid-program from Canada. She sat quietly and visually observed the children, but did not interact with them or with the rabbits. Interviews took place during the same period and were conducted by a Canadian bilingual (English/ German) research assistant who was also a pre-service teacher visiting Germany on practicum. She did not student teach in the classroom of any of the participants. The research assistant interviewed each child individually according to a script, recorded answers, and then translated the answers into English. Interviews were conducted in a classroom away from the rabbit club. By using a script of questions, minimizing the interactions between the researchers and the students, and having a consistent handler (teacher) for both programs, we designed the study to minimize limitations such as handler effects and researcher bias, as described and recommended by Stern and Chur-Hansen (2013).

MEASURES

Pre/post visit measures

The study employed a survey once per week before and after a session with the rabbits. The pre-visit survey began with a question about recent events that may have affected the participants' subjective feelings of well-being (e.g. exam stress, a conflict with a friend), and continued with the *Student Life Satisfaction Survey* (SLSS, Huebner, 1991a, 1991b), a 7-item inventory that uses a 6-point Likert scale described by Huebner and Furlong (2016). A score of 6 indicates strong agreement, whereas a score of 1 indicates strong disagreement. Example statements include, "My life is going well" and "I have what I want in life." The third and fourth statements of the survey are reverse scored. This survey has been used with children and youths aged 8-18 in both clinical and non-clinical populations. It is recommended as a global measure of students' life satisfaction, and has demonstrated good unidimensional internal consistency, usually reported in the range of .80. Children's responses to the scale are fairly stable but are also sensitive to intervention programs. The scale is responsive to both positive and negative life events.

Two additional items were added using the same 6-point Likert scale. These items measure perceived happiness and calmness with the simple statements, "I am happy" and "I am calm." After the AAA visit, the students filled out the same survey and also indicated how long they spent with the animals and what activities they did while with them (e.g. playing and petting, feeding, cleaning cages, or watching).

Pre/post study measures

All participants also filled out two surveys at the beginning and 2 surveys at the end of the study. The first survey was comprised of items selected from the Evidence2Success Youth Experience Survey (Casey, 2012) that addressed

children's overall self-perceptions of emotional well-being, self-regulation, social cohesion, and social support over the past 6 months. Example statements include: "I worry a lot" (emotional well-being sub-scale, reverse scored, 3-point scale), "I know how to calm down when I am feeling nervous" (self-regulation, 4 point scale), "I am kind to younger children" (social cohesion, 3-point scale), and a request for the number of friends the child has with whom he/she they can talk about problems (social support). The subscales have been used with students in grades 6-12, and they demonstrate alpha co-efficients ranging from .80 to .87. This survey was selected to measure longer term changes in well-being than the SLSS, which measures short-term responses to interventions.

The second scale is the WHO-5 test of well-being (WHO, 1998). Example statements include: "I feel happy and in good spirits" and "my daily life has been filled with things that interest me." Students respond on a 6-point scale with 5 indicating *All of the time* and 0 indicating *At no time*. Based on a review of over 200 studies, Topp, Østergaard, Søndergaard, and Bech (2015) showed that this 5-item survey has high validity and reliability, is responsive to treatment effects, has high applicability across a variety of settings, and is an effective screening tool for depression.

FINDINGS

Visits with the rabbits ranged in duration from 10 to 80 minutes, with an average duration of 38 minutes interacting with the rabbits over the 13 weeks of visits.

Pre-post Visit Findings

Did children's scores on the SLSS (Huebner, 1991a, 1991b) or perceptions of happiness and calmness differ significantly before and after their visits the animals? No. While the SLSS scores rose from before ($M = 4.55$) to after ($M = 4.61$) the visits, a paired-sample t -test indicated that the difference was not significant, $t(122) = -1.07$, $p = .29$. Likewise, there were no significant differences in pre- to post-visit changes to children's happiness, $t(120) = .08$, $p = .94$, $M_{pre} = 4.88$, $M_{post} = 4.87$, or calmness $t(123) = .44$, $p = .66$, $M_{pre} = 4.73$, $M_{post} = 4.68$, from before to after the visit with the rabbits.

Did the children's activities during the visit (petting rabbits versus not petting rabbits) differentially affect children's pre-visit to post-visit changes on the SLSS (Huebner, 1991a, 1991b) or their perceived happiness and calmness? Partially. An ANOVA showed that there were no significant differences in pre- to post-visit changes to life satisfaction between children who touched the animals (petting and playing with them) and those who did not touch the animals (cleaning, feeding, and watching them), $F(1, 114) = 1.09$, $p = .30$, nor in their happiness, $F(1, 112) = 3.69$, $p = .06$. However, results indicated that the children who petted the animals made gains in calmness ($M = .16$) from pre- to post visit, while children who did not pet the animals became less calm ($M = -.31$). The differ-

ence in perceived calmness pre- to post-visit was significantly different between the children who petted the animals and those who did not, $F(1, 115) = 4.13$, $p = .04$. Comments from the participants supported the importance of touch and its relationship to students' perceived calmness: "When I stroke them I feel better too. I calm down, and I feel happy." "Maybe a little more calm [when I stroke them]." "My favourite part [is] when the rabbits come to me and I am touch[ing] them." "When they come to me it means they like me." Inversely, "If they don't come, I think they don't like me. I think I did something wrong. Maybe I am too loud."

In summary, there were few pre- to post-visit differences in the effects on the dependent variables of life satisfaction, calmness, and happiness. However, children who petted the animals made significantly greater gains in calmness as a result of the visits than those children who did not pet the animals.

Pre-Post Study Findings

Did children's scores on the WHO-5 and the Evidence2Success Inventories differ significantly before and after the study with the animals? A series of t tests were conducted to determine if there were significant differences between the children's scores on three sub-scales of the Evidence2Success (self-regulation, social cohesion, and social support) and the WHO-5 from before they began the AAA program until when they finished it 13 weeks later. There were no significant pre- to post-study differences in the three Evidence2Success scores, $t_{\text{range}} = -.02 \text{ to } .54$, $p_{\text{range}} = .59-.99$. However, the t tests revealed a significant difference in children's well-being as measured by the WHO-5, $t(12) = -2.29$, $p = .04$, from before the AAA program ($M = 15.54$) to after the program ($M = 18.31$). Children who participated in rabbit club demonstrated better well-being on the WHO-5 scale at the end of the 13 weeks than they did at the beginning. Moreover, children in a control group did not demonstrate similar gains in well-being over the course of the dog program. It should also be noted that while the WHO-5 pre-study screening showed that three of the students were potentially experiencing depression as indicated by a total WHO-5 score of 13 or under, diagnostic follow-up with a psychologist indicated this was not the case with any of the children. All three of these children's post-study scores, as well as those of the rest of the children who participated, did not show risk of depression as indicated by their WHO-5 scores at the end of the study.

DISCUSSION

The findings revealed several interesting but unexpected results.

First, we found that there were few significant differences in any of the dependent variables prior to and following the visits with the animals: life satisfaction and perceived happiness and calmness were not significantly affected by the visits to the animals, as indicated by the pre- to post-visit data. This finding was surpris-

ing, as Dimitrijevic's (2009) review of the research base on AAT showed that its benefits included improved quality of life, while Every et al. (1997) showed that refugee children in AAT showed greater positive emotions. Similar short-term effects on the dependent variables were not demonstrated in our own study. This may have been a result of the brevity of the sessions, whose average duration was 38 minutes. It also may have been an artifact of the difference between AAT and being a participant in a school-based AAA. Zilcha-Mano, Mikulincer, and Shaver (2011) pointed to the time-limited nature of the AAA human-animal relationship as a possible barrier to individuals realizing the "full-blown attachment relationship" with the AAA animals, and posited that the accompanying benefits may also be weaker (Zilcha-Mano, et al., 2011, p. 545).

Every et al. (2017) showed that therapists using animal-based therapies with refugee children noted that the children were calmer in the presence of the therapy animals. Being as we found no pre- to post-visit differences in calmness, we wondered whether our lack of findings was moderated by the types of interactions between the children and the rabbits. We based this consideration on the work of Handlin et al. (2012), who hypothesized that one of the benefits of AAA comes from touch. They pointed out that oxytocin, a chemical associated with feelings of calmness, happiness, and peace, is produced as a result of touching and petting an animal. Indeed, when we separated the children who touched the animals at their visits from those who did not, we found data that supported the work of Handlin et al. (2012). While the students who petted the animals became calmer during the AAA visits, the children who did not pet the animals became less calm. Other researchers such as Hart and Yamamoto (2015) have also explored the concept of touch—framed as "contact comfort"—and Beetz et al. (2011) found that children's decreases in distress are correlated with longer durations of physical contact with an animal. Together, these findings suggest that the short-term effects of animal interactions on children's perceived calmness are affected by physical contact with the animals.

In terms of the longer effects generated pre- to post-study, we found a similar mix of outcomes. We found that the children's perceived self-regulation, social cohesion, and social support were not significantly different from pre- to post-study. Of these, the lack of social cohesion was most surprising, as one goal of AAA is to decrease isolation and loneliness of children in school settings. Kotrschal and Ortbauer (2003) showed that the presence of a dog in a school setting could decrease the social isolation perceived by students there. In order to determine if ceiling effects were taking place that may have affected the range of growth available, we examined the pre- and post-study means. The pre-study mean was 2.55 and the post-study mean was 2.56. Recall that this component of the measure uses a 3-point scale, indicating that there was room for growth on this measure, had the students' perceptions of social cohesion grown during the study.

Although the effects of the program in self-regulation, social cohesion, and social support were non-significant, the effects of the program on overall well-being was significant. Like the two meta-analyses that have been conducted showing the benefits of AAT on emotional well-being (Nimer & Lundahl, 2007; Souter & Miller, 2007), our study showed that AAA could generate similar effects. Moreover, students who were indicated for further diagnostic work based on their pre-study WHO-5 scores of well-being made gains during the study that elevated them above the threshold for the risk of depression as indicated on that measure.

Of particular interest is the finding that the pre- to post-study gains in children's well-being that were demonstrated in the rabbit club were not replicated in the dog club. This finding supports the work of Crossman (2017), who suggested that researchers should be careful not to generalize effects across species of animals. This finding has two possible explanations. First, the children in the study, who were mainly Muslims, may have held negative attitudes toward dogs (Friesen, 2010). While possible, this explanation is unlikely, as the children chose to participate in dog club over the other programs offered by the school. It is more likely that the children in the dog club had limited exposure to the dog, Forest. With only one dog to share between 13 students, most children were unable to spend a significant amount of time touching the dog. In turn, this could have limited the potential bonding between individual children and Forest, or could have limited the opportunity to gain the benefits of touching the dog to the same degree provided to the children in the rabbit program. The difference in the perceived calmness in children participating in the rabbit program and dog program lend further support to the importance of touch in garnering positive effects of human-animal bonds.

All studies have limitations, and ours is no exception. First, although our study included both qualitative and quantitative methods including surveys, interviews, observations, the data were self-reported. Self-reported data can suffer from limitations such as desirability effects (Stern & Chur-Hansen, 2013). Likewise, the children were self-nominated, likely indicating that they enjoyed being with rabbits and dogs. It cannot be assumed that children who dislike or are afraid of animals in general or rabbits in particular would respond the same way (Crossman, 2017; Crossman & Kazdin, 2018). The small sample size is a limitation that can be addressed in subsequent studies. Likewise, the study school is a unique setting and subsequent studies should examine the effects of AAA in a variety of school types and countries using a variety of types of animals in order to increase the generalizability of the findings. These limitations notwithstanding, the current research suggests that school-based AAA may be a plausible, proactive way to facilitate short-term perceptions of calmness and long-term well-being in young, migrant students.

As Canada welcomes more newcomers and these children of diverse cultural backgrounds adapt to their new country, customs, and schools, AAA may be

a viable complement to other school-based, social-emotional programming. The current research suggests that the presence of a classroom pet alone may be insufficient to garner the positive effects of animal-human interactions on children's calmness and well-being. Opportunities for physical contact with pets as well as the type of pets should be considered in supporting the well-being of children in schools.

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