Original Research

Surveying dog owners' use, understanding of, and communication with veterinarians about complementary and alternative veterinary medicine

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Abstract

Background

Complementary and alternative veterinary medicine (CAVM) seems to be gaining acceptance by pet owners. Client-veterinarian communication about CAVM is important to explore client perceptions and facilitate open exchange of ideas between owners and veterinarians.

Methods

Online, cross-sectional survey of dog owners to evaluate CAVM use and client-veterinarian communication about CAVM. Based on the extended Theory of Planned Behaviour, factors influencing the intention to use CAVM were evaluated.

Results

Past CAVM use was reported by 45.3% based on 1000 valid surveys. The attitude towards CAVM was generally positive. Perceived knowledge about CAVM positively predicted perceived behavioural control and attitude towards CAVM. Both were the strongest predictors of future CAVM use. 45.7% of clients had already talked to their veterinarian about CAVM. This conversation was mainly initiated by the owner (66.3%). Owners expected the veterinarian to have knowledge about CAVM (91.5%) and offer referral (71.5%).

Limitations

Difficulty in classifying and defining CAVM modalities.

Conclusions

Owners' perceived behavioural control and attitude towards CAVM predict CAVM use. Failure to engage in a conversation about CAVM hampers clients to partner with veterinarians to discuss the treatment approach and maximize patient outcome. The veterinarian plays an essential role in providing objective accurate information about CAVM.

Keywords

Complementary medicine, Alternative medicine, Complementary and alternative veterinary medicine, Holistic approach, Human behaviour, Motivation, Theory of Planned Behaviour, Structural equation modelling

Introduction

An increased interest in and use of complementary and alternative medicine (CAM) is reported in human medicine.[1-5] The overall prevalence of CAM use is at least 20-25% on a yearly population basis worldwide and as high as 76% in specific populations such as chronic back pain patients.[3,6] Similarly, complementary and alternative veterinary medicine (CAVM) is gaining acceptance amongst pet owners.[7-9] The American Veterinary Medical Association defines CAVM as "a heterogeneous group of preventive, diagnostic, and therapeutic philosophies and practices" which are not traditionally incorporated in the veterinary curriculum and may differ from current scientific knowledge.[10] Modalities include veterinary acupuncture, homeopathy, manual therapy, chiropractic, phytotherapy and nutraceutical medicine[7-9]. When CAVM is used in addition to traditional veterinary medicine, it is called complementary veterinary medicine. If CAVM is used in lieu of traditional veterinary medicine, it is called alternative veterinary medicine.[7] Several of these therapies or approaches do not yet have evidence to support their efficacy and/or safety profile.[11,12] In addition, these therapies are often performed by non-veterinarians, further called alternative therapists, with a wide range of proficiency and experience. In Belgium, the country where this study was conducted, no general certification or registration system for CAVM modalities is available.

Little information is available regarding the prevalence of CAVM use amongst veterinary clients, although CAVM use in dogs and cats diagnosed with cancer was reported by 65% of pet owners.[8] A survey among the AVMA-accredited colleges demonstrated that the number of dedicated courses in integrative veterinary medicine decreased over the past decade, but student exposure to CAVM in teaching hospitals may have increased.[13] CAVM therapies have been described for several conditions in companion animals such as musculoskeletal, neurologic and behavioural disorders and lower urinary tract diseases. [8,14,15] Furthermore,

CAVM has also been described for oncology and geriatric patients.[8,14-20] Indicated reasons for CAVM use included improvement of wellbeing, failure of traditional treatment, chronic illness, pain reduction and improvement of immune function.[7,8] Lafuente et al. (2019) surveyed clients about postoperative care after surgical repair for cranial cruciate ligament disease. Physiotherapy performed by trained therapists was reported by 32% of dog owners as part of the rehabilitation plan.[21] Clients' knowledge level concerning the options for and benefits of physiotherapy was correlated with choosing postoperative physiotherapy.[21] In a study on dog owners' perceptions about the treatment of behavioural problems, respondents felt most comfortable giving their dogs herbal or nutritional supplements compared to other treatments such as medication, pheromonal products or cannabinoids.[31]

Whether and to which extent pet owners discuss CAVM use with their conventional veterinarian has not been previously explored. Excluding veterinarians from the diagnostic and treatment process and non-disclosure of CAVM use could have serious implications for the animal's health and wellbeing as not all CAVM modalities are underpinned by sound scientific knowledge.[22-25] Lana et al. (2006) mention that herbal products could potentially interfere with important systems in the body (e.g. metabolic function), influencing for example drug levels that are used concurrentlyor having a direct toxic effect.[8] Client-veterinarian communication about CAVM is important to explore the client's pre-existing perceptions and receptivity to dialogue about the use, efficacy and safety of CAVM in veterinary patients. In human medicine, an open dialogue about CAM is increasingly advocated to ensure safe and integrated health care practices. Moreover training programs are being developed for physicians to improve disclosure of CAM use and adequately address patient concerns.[26,27]

Recently, the authors described the motivating factors for CAVM use among horse owners using a framework based on the Theory of Planned Behaviour (TPB) by Ajzen which can be

used to predict human behaviour.[7,28] In short, three motivational factors guide the intention to act in a certain way: (1) attitude towards the behaviour, (2) subjective norms or the perceived opinion of others and (3) perceived behavioural control or perceived ability of performing the behaviour. In horse owners, the intention to use CAVM was predicted by a positive attitude towards and a higher perceived knowledge about CAVM and high perceived behavioural control including perceived CAVM efficacy. It is unknown whether these factors can be applied to CAVM use in companion animals.

This study set out to accomplish three goals. First, the study aimed to evaluate prior CAVM use among dog owners in the Flemish region and its association with client demographics. Second, we aimed to test a conceptual model based on the Theory of Planned Behaviour, in which we hypothesized that dog owners' intention for future CAVM use is influenced by subjective norms, attitudes towards CAVM, perceived behavioural control and perceived knowledge (Fig. 1). The third objective was to evaluate current client-veterinarian communication about CAVM use.

Materials and methods

Study design

An online survey (Qualtrics®XM)[a] that was written in Dutch was designed by the research team to target dog owners living in the Dutch-speaking part of Belgium (Flanders). The online survey was distributed through social media (Facebook®), via the university's official website and two websites targeting pet owners[b]. Over a 4 week period in November-December 2019, the survey was posted ten times on the Facebook® page of one of the researchers. Furthermore, the post was shared in different Facebook® groups for

[a] See: http://www.qualtrics.com

[b] See: https://www.maxizoo.be/nl/ (website pet supplies shop), https://www.ugent.be/en (website Ghent University), https://www.ugent.be/di/en (Faculty of Veterinary medicine), https://www.ugent.be/di/irp/en (website department researchers), https://www.woef.be/ (magazine)

pet owners, the Facebook® pages of the other involved researchers, Ghent University and the Faculty of Veterinary Medicine. The survey was posted on websites such as the Faculty of Veterinary Medicine, Ghent University, a large pet supplies shop and a magazine for dog owners (Woef®). Data were collected anonymously. Three vouchers of €50 for a pet supplies shop (Maxi Zoo®), contributed by the research group, were raffled to improve participation. Participation in the raffle was voluntary; participants could elect to provide their name and email address for entry into the raffle or to express interest in participation in future research. Participant names and contact information were dissociated from the responses before analysis. Following data collection, one of the researchers drew names of participants randomly and alerted the winners via email. Ethical approval was obtained from the ethics committee of the Faculty of Political and Social Science, Ghent University.

The survey started with a short introduction on the topic, after which participants were required to provide informed consent in order to proceed with the first question. Response validity was based on a completed survey, correct answers for two control questions included in the survey to control response quality, surveys completed by non-veterinarian dog owners, owning at least one dog and respondent's age ≥18 years.

Survey

The questionnaire (Supplementary information 1) was pre-tested by three veterinarians of the Faculty of Veterinary Medicine, two private practitioners and five non-veterinarians owning one or more dogs. To improve clarity, five questions were reworded as a result of direct feedback. In addition, the option sets for questions nine and ten were revised. The following CAVM definition was used to include therapeutic modalities which are not routinely taught in the Flemish veterinary curriculum and/or are often performed by non-veterinarians: "CAVM

includes treatments and therapies which are used together or instead of conventional veterinary medicine". The survey focused on the following therapies: homeopathy, aromatherapy/essential oils, herbs, Bach flowers, manual therapies such as osteopathy, chiropractic and massage, acupuncture, dry needling and physiotherapy such as underwater treadmill, laser therapy, cryotherapy and thermotherapy.

The survey consisted of five sections: (1) perceived and actual knowledge about CAVM; (2) CAVM use; (3) Likert scale questions[c] regarding attitude towards CAVM and motivators of CAVM use; (4) communication about CAVM with the veterinarian; and (5) participant demographics (age, gender, work, province etc.). Further details can be found in Supplementary Information 1.

Constructs

The intention to use CAVM in the future was predicted by a theoretical framework based on the TPB, extended by including perceived knowledge. Intention to use and attitude towards CAVM were measured by Likert-scale questions based on the TPB [28,29] (see Supplementary information 1). Item reliability was measured as the internal consistency based on Cronbach's alpha ($0.8>\alpha\geq0.7$ acceptable, $0.9>\alpha\geq0.8$ good, $\alpha\geq0.9$ excellent). Motivators for using CAVM such as subjective norms and perceived behavioural control including benefits, harm and efficacy were evaluated using seventeen Likert-scale questions. Perceived knowledge of CAVM was measured by three Likert-scale questions while actual knowledge was measured using five statements (true, false or no idea) with a sum score. Trust in the veterinarian and communication about CAVM with the veterinarian were assessed using Likert-scale and yes/no questions. In the results section, percentages of respondents who agreed with a

[c] Likert scale question type: 7-point (Totally disagree – Totally agree)

statement are the sum of respondents who indicated ‘somewhat agree’, ‘agree’ and ‘totally agree’ on the 7-point Likert scale questions.

The constructs for intention to use and attitude showed excellent internal consistency (Cronbach’s α=.961 and α=.945). Internal consistency was acceptable for perceived knowledge (Cronbach’s α=.799).

Data analysis

Statistical analysis was performed using SPSS Statistics® (Version 27 IBM) and MPlus. Descriptive statistics, cross-tabulations and chi-square calculation were used for determining associations between variables. The Mann-Whitney U-test was used for comparing scores between CAVM users and non-users. Significance was set at $P<0.05$. Measurements based on ordinal scales were reported as median and interquartile range (IQR). Multivariable logistic regression with backward stepwise selection was performed to evaluate associations between past CAVM use and demographics.

To test the assumptions in the conceptual model (Fig. 1), structural equation modelling with maximum likelihood estimation was conducted in Mplus.[30] The items included for structural equation modelling and correlations among the latent constructs can be found in Supplementary information 2. Regarding the conceptual model, the analyses were conducted in two steps. First, a measurement model was built to verify the model fit of the latent constructs. Second, a structural model was set up following all the hypothesized relationships.

Results

Participant demographics and CAVM usage

A total of 1958 dog owners participated in the survey with 958 responses removed from the data set due to not meeting the conditions, resulting in a data set of 1000 valid

responses. The reasons for exclusion of 958 surveys were as follows: surveys not fully completed (n=702/1958, 35.9%), control questions not answered correctly (n=146/1958, 7.5%), surveys completed by vets (n=97/1958, 5%), participant didn't own one or more dogs (n=8/1958, 0.4%) and age of respondent < 18 years (n=5/1958, 0.3%).

Participants were mainly female (92.0%), with a mean age of 39±14 years. The majority owned one (52.0%) or two (30.2%) dogs. Nearly 20% indicated that they were involved in a profession with dogs (e.g., dog trainer or breeder), while 5.8% indicated they were active as an alternative therapist for humans or animals (Table 1). Past CAVM use for their dog was reported by 45.3% (n=453/1000), while 67.8% (n=678/1000) of participants reported self-use[d] of CAM. Using multivariate logistic regression, past CAVM use in dogs was associated with higher age of dog owners, self-use, working self-employed or in a liberal profession[e], working with dogs, being an alternative therapist and owning more dogs (Table 1).

Among CAVM users (n=453), the most popular modalities were aromatherapy, Bach flowers and herbs (78.1%, n=354/453), homeopathy (75.3%, n=341/453) and manual therapies (66.4%, n=301/453). Past use of physiotherapy (44.4%, n=201/453) or acupuncture and dry needling (37.5%, n=170/453) was less common. The most commonly reported frequency of CAVM use was several times per year. Figure 2 gives an overview of the frequency of usage among CAVM users.

Possible reasons for CAVM reported by the participants (n=1000) included: improving the dog's general wellbeing (72.9%), followed by chronic health problems (70.6%), rehabilitation after surgery (64.0%) and a condition which had not improved after

[d] Self-use was defined as the use of alternative healthcare as a patient, either by visiting an alternative therapist or using CAM by themselves (e.g. herbs).
[e] Liberal profession means a profession practised on the basis of relevant professional qualifications in a personal, responsible and professionally independent capacity by those providing intellectual or conceptual services in the interests of the client and the public. https://www.lawinsider.com/dictionary/liberal-profession

traditional veterinary treatment (60.9%) . The responses were based on participants' ranking of researcher-developed responses.

Motivators for CAVM use

Out of 1000 dog owners, 32.2% of participants reported to have an adequate knowledge of the efficacy, usage and safety of CAVM. Actual knowledge had a median (IQR) score of 2/5 (1-3). Furthermore, 70.6% of owners agreed that their knowledge about CAVM is an important factor in the decision to choose CAVM.

The attitude towards CAVM had a median (IQR) score of 5.75/7 (4.5-7). Regarding perceived CAVM efficacy, 48.2% agreed that CAVM has clearly improved the health of dog(s) around them, and 67.6% agreed that CAVM enables them to influence their dogs' health. While 8.9% of dog owners agreed that CAVM efficacy is usually based on a placebo-effect, 30.7% agreed that there is scientific evidence for CAVM therapies and 30.4% agreed that therapies which were not scientifically tested should be advised against. Out of all participants, 15.6% indicated that conventional therapies have insufficient efficacy. The majority (73%) stated that CAVM is animal friendly. Out of 1000 dog owners, 38.1% agreed that the use of CAVM involves no risks to their dogs' health. Looking at the role of subjective norms, 14.3% stated that most dog owners in their environment used CAVM, while 43.7% indicated that CAVM use was encouraged by other people. Regarding ease of use, 47.3% described CAVM as user-friendly, while 17.4% agreed that it is easy to find a therapist. The most important factors for choosing a therapist were that the therapist was certified (officially recognized certificate), had practical experience with animals and that they were a veterinarian. Cost of therapy was least important to the client.

Factors influencing the intention to use

Our analyses revealed that the measurement model aligned with our data, with multiple fit indices indicating a good fit (χ^2(180)=958.812, P<0.001, CFI=0.95, RMSEA=0.066 (CI: 0.062–0.070), SRMR=0.37, with all factor loadings above .48). An overview of all items and the correlations between the variables in the measurement model are shown in the supplementary information (Supplementary information 2).

The structural model (Fig. 3) also aligned with the data, showing a good fit in multiple fit indices, χ^2(180)=958.512, P<0.001, CFI=0.95, RMSEA=0.066 (CI: 0.062–0.070), SRMR=0.037. Dog owners' perceived knowledge on CAVM was positively related to their attitudes towards CAVM (ß=.51, P<0.001), to their perceived behavioural control (ß=.73, P<0.001) and to their social norms (ß=.62, P<0.001). Furthermore, all original predictors (attitude towards CAVM, social norms and perceived behavioural control) in the TBP framework were confirmed in the final structural model. Perceived behavioural control (including benefits, harm, and efficacy) was identified as the strongest predictor of the intention to use CAVM (ß=.70, P<0.001), followed by attitude towards CAVM (ß=.12, P<0.001) and social norms (ß=.08, P<0.05).

Communication with the veterinarian

Participants indicated the veterinarian (88.4%, n=884/1000), websites (64.0%, n=640/1000), other dog owners (60.3%, n=603/1000), other friends, colleagues or family (42.8%, n=428/1000) and the breeder or trainer (39.5%, n=395/1000) as the main sources of information about CAVM. The information participants would most commonly look for included finding a veterinarian who also offered CAVM (81.3%, n=813/1000), different types of CAVM (77.6%, n=776/1000), experiences of other dog owners (69.4%, n=694/1000) and CAVM therapists nearby (67.9%, n=679/1000). Information about dosages (40.3%, n=403/1000) or distribution channels (31.0%, n=310/1000) was less commonly asked for. Although 69% (n=690/1000) of all dog owners agreed or fully agreed that communication

with the veterinarian about CAVM is positive for the dog's health, only 54.8% (n=548/1000) reported that their veterinarian was open to a conversation about CAVM, while 41.4% (n=414/1000) indicated that their vet supports CAVM use. A vast majority of participants agreed or fully agreed that they would inform their vet if they used CAVM alongside conventional therapies (91.3%, n=913/1000) or if side effects were to occur while using CAVM (95.6%, n=956/1000).

Overall, 45.7% (n=457/1000) of participants had already talked to their veterinarian about CAVM, of which 81.8% (n=374/457) reported prior CAVM use. Communication with the veterinarian was significantly associated with past CAVM use (X^2 = 453.4; P<0.001). However, 17.4% of CAVM users (n=79/453) stated that they had never talked about CAVM with their veterinarian. A minority of dog owners who had discussed CAVM with their veterinarian indicated that the veterinarian had proposed a CAVM therapy (44.9%, n=205/457), had asked about their interest in CAVM (33.7%, n=154/457) or had referred them to a therapist (29.1%, n=133/457). Only 51.4% (n=235/457) reported that there was good communication between the veterinarian and alternative therapist, although 59.5% (n=272/457) stated that CAVM and conventional therapy were combined in consultation with the veterinarian. Out of all participants, 54.3% (n=543/1000) had never talked to their veterinarian about CAVM, of which 14.5% (n=79/543) did use CAVM in the past. Dog owners who had not discussed CAVM with their veterinarian either had never asked their vet about CAVM (87.3%, n=474/547), did not know that the veterinarian could provide information on this subject (51.2%, n=278/547) or thought that the vet should initiate the conversation about CAVM if needed (51.7%, n=281/547). Out of all participants, 91.5% expected that the veterinarian should have knowledge about CAVM and 93% indicated that the vet should be able to provide information on the subject. Owners mainly expect referral to

an alternative therapist if needed (71.5%), in addition to general information about CAVM (68.8%) and specific information such as methods, side effects or costs (62.1%).

Discussion

CAVM use was common in this study, with 45.3% of dog owners indicating that they had used CAVM for their dog(s) in the past. Data in literature regarding CAVM use in pets are scarce, but the high prevalence is in line with other reported studies such as Lana et al. (2006) and Lafuente et al. (2019).

Lana et al. (2006) reported a high prevalence of 65% for CAVM use in dogs and cats with cancer. Nutritional supplements, diet and vitamins were the most commonly used modalities, followed by herbs/botanical, Reiki/healing touch and flower essences therapy.[8] Although almost 50% of our participants indicated some CAVM use in their dogs, this should not be regarded as the prevalence of CAVM use in the total dog owner population in Flanders. Selection bias and non-response bias influence the results of surveys.[32] Participation and completion rates were likely higher among dog owners with a positive attitude towards CAVM, which also explains the high proportion (5.8%) of participants indicating they are alternative therapists themselves. In addition, there was a selection bias towards dog owners who are active on social media which might explain the young study population. Furthermore, women are more likely to participate in a survey than men[33] which might explain the high percentage of female participants. However, these biases were also present in a previous study by our group in horse owners, which was distributed and promoted in a similar way. The prevalence of CAVM use in the horse owner population was 72.5%, indicating that the use of CAVM is more widespread in equine compared to companion animal medicine.[7]

Most important factors influencing the intention to use CAVM were perceived behavioural control including perceived benefits, potential harm and efficacy of CAVM, as

well as the attitude towards CAVM. The perceived knowledge about CAVM was highly associated with both. In line with previous studies, owners with a history of using alternative therapies for themselves frequently reported CAVM use for their dog. Positive personal experiences probably affect the attitude towards CAVM and the willingness to use these diagnostic or therapeutic modalities for their pet.

The veterinarian was seen as an important source of information by dog owners. Previous studies also demonstrated that the veterinarian has an important role in client decision-making.[21,34] However, whether a veterinarian recommends or advises against a certain therapy depends on a number of factors including the veterinarians' attitude towards and prior experience with the therapy. In the study of Lafuente et al., only 46% of dog owners had been advised to pursue physiotherapy. The authors concluded that increasing veterinarians' knowledge of the benefits and modalities of physiotherapy is needed. Dog owners in our study expected the veterinarian to have knowledge about different CAVM modalities. The assumption that the veterinarian could not provide information on this subject was a reason for non-disclosure of CAVM. Increasing the veterinarians' knowledge could be achieved by increased training on integrative veterinary medicine in veterinary colleges[9,35] or postgraduate training for veterinarians. However, courses about CAVM are not generally incorporated in the curricula of most veterinary colleges veterinarians.[10] In literature, it has been suggested that students should have knowledge about the existing CAVM modalities.[9,35] For instance, according to Memon et al. (2016) modalities such as acupuncture, manual therapies, herbal therapies and veterinary manipulative therapy should be included in the curricula. Knowledge about CAVM would enable veterinarians to answer questions and educate clients about CAVM and therefore would make it easier to start the conversation about it.[9,35] Information about CAVM could be included in the veterinary curriculum, for example what modalities CAVM includes, where educational resources can be found and to whom veterinarians can

refer if necessary. In addition, a broader science base for CAVM is needed. Along with the incorporation of courses about CAVM in the curriculum, more research needs to be conducted to improve knowledge about its mechanism and efficacy.

Our results show a high intention to future use, which was associated with perceived knowledge about CAVM. The participants' actual knowledge was low which reinforced the importance of the veterinarian as an educator. Providing veterinarians with adequate information to provide objective and evidence-based advise is crucial. Since the demand for CAVM use seems to be increasing, veterinarians need to educate clients, given the speed at which false information can spread especially through mediums such as social media.

The internet is indicated as an important source of health information in literature.[36] In a study with 1622 analyzed surveys, 72.7% of pet owners indicated to use the internet for pet health information at least occasionally.[37] Social media, including Facebook groups, also play an important role as a source of information, with many owners reporting it as a "useful, but not entirely trustworthy" source.[38] Owners find it important to access reliable and correct online information, and feel the need for guidance by a veterinarian when looking for information online with referral to trustworthy information.[36,39,40]

Client-veterinarian communication is of paramount importance when CAVM therapies are used, especially since herbal supplementation was frequently reported in this study. Nondisclosure of self-administered supplements raises concerns regarding lack of product quality control, potential direct toxicity, interference with the pharmacokinetics of other drugs or unwanted drug interaction.[21] In addition, CAVM therapies applied by non-veterinary practitioners may cause indirect harm if underlying disorders are not adequately recognised and appropriate treatment is delayed.

In our study, 46% of dog owners stated that they had talked to their veterinarian about CAVM. This is higher than the number reported in the study by Lana et al. (2006), where

only 35% of participants had discussed CAVM with their veterinarian. This might be explained by desirability bias, as respondents were aware that the survey was carried out by veterinarians. There might have been a tendency to report the desirable answer that they had talked to their veterinarian. Despite this bias, 17.4% of participants had used CAVM in the past without discussing this with their veterinarian. In addition, participants were only asked whether they had talked to their veterinarian about CAVM, and not if they discussed the specific treatment of their dog.

A dialogue between veterinarians and clients about CAVM can be difficult. A relationship-centered approach has been described by Shaw et al. for handling difficult situations (2006). It includes respect for the owner's interests, ideas and expertise in caring for the pet, asking for the owner's opinion and collaboration between owner and veterinarian to maintain optimal care for the animal. [41] According to the literature, this communication style includes the use of open-ended questions, non-verbal skills, careful use of language and empathy, respecting clients 'autonomy and avoiding guilt implications.[42,43] Initiating a relationship-centered conversation about CAVM could start with open-ended questions about the clients' interest, opinion and experiences with CA(V)M. Since self-use is strongly correlated with use in dogs it is important to know the attitude and behaviour of the owners. Being aware of small non-verbal signals and careful listening to cues about CAVM are important. Taking time during consultations, gaining trust and being non-judgemental could also help to build a relationship. Insufficient consultation time has been indicated as a challenge in veterinarian-client interaction by Pun et al. (2020).[42]

Courses on communication skills, in particular about CAVM and other difficult topics, could make it easier for veterinarians to talk about CAVM. Pun (2020) and other researchers indicated a lack of such training in the veterinary curricula.[42] However, communication skills

are now required in the curriculum by AVMA Council of Education.[f] As such, there is actually more communication training in the curricula than ever before, for example with the incorporation of role-play with simulated clients for training bad news delivery.[44]

Since we now know that only 45.7% (n=457/1000) of participants had already talked to their veterinarian about CAVM, further research is needed to evaluate possible reasons for non-disclosure on both the owners' and the veterinarians' side. A qualitative study including interviews with dog owners and veterinarians would help to investigate the behavior and attitude of both parties more thoroughly. Further research could also include the development of evidence-based guidelines for improving disclosure of CAVM use in veterinary health care. In human medicine, Mentink et al. (2021) explore communication about CAM in oncology since non-disclosure of CAM is also common in this patient group. They presented the development of a toolbox for enhancing communication about CAM after collecting information via interviews, observations, surveys and reviews. The authors indicated that "the toolbox aims to provide tips and tricks on how to conduct an open and effective discussion about the use of complementary medicine in oncology".[45] A similar toolbox for veterinarians could provide evidence-based information on different types of CAVM to improve the vet's knowledge and a list of certified therapists to enable referral. Furthermore, communication skills, needed to improve disclosure and open discussion of CAVM use, could be presented. Skills such as open-ended questions, a neutral attitude, active listening and responding appropriately to cues about CAVM use (e.g. asking questions; non-judgemental, respectful and objective communication) are important for veterinarians to gather information and to build a relationship with the client. Future research will need to evaluate in detail which additional factors play a role in communication about CAVM for both parties, the animal's owner and the veterinarians.

[f] https://www.avma.org/education/accreditation-policies-and-procedures-avma-council-education-coe/coe-accreditation-policies-and-procedures-requirements

Limitations

The main limitation of this study is the difficulty in classifying and defining alternative therapies. The CAVM definition could have influenced the outcome, especially since the motivators were evaluated for CAVM in general. The results might be different for specific modalities, e.g., those generally endorsed by veterinarians such as physiotherapy versus those not generally recommended like homeopathy. Another potential limitation is the high number of invalid surveys due to our strict selection criteria. The question about the participants' general attitude towards CAVM modalities was complex and could have led to respondent fatigue. As people interested in CAVM were more likely to participate and complete all questions, this may have introduced bias. Since the incentive was not that high we do not expect that it attracted people who were not really interested in providing genuine responses. The length of the survey and duration are also important, as shorter surveys have a higher response and completion rate.[46] To avoid incomplete surveys and participation of uninterested people leading to default answers to get to the end 1. the amount of questions was limited to 14 (excl. demographics), 2. the survey was designed to be completed in approximately ten minutes and 3. the participants were informed about the duration upfront.

Conclusions

The intention to use CAVM was mainly associated with its perceived benefits, harm and efficacy as well as positive dog owners' attitude towards CAVM, which were highly related to perceived knowledge. The veterinarian plays a crucial role for providing objective and accurate information to pet owners about CAVM modalities and avoiding non-disclosure of CAVM use, which may harm animal welfare.

Authorship

1. Substantial contribution to conception and study design, acquisition of data and analysis and interpretation of data: P. Keller, A. Decloedt and I. Vanwesenbeeck
2. Involved in drafting the manuscript and revising it critically for important intellectual content: P. Keller, A. Decloedt and I. Vanwesenbeeck
3. Each author participated sufficiently and approved the final version to be published: P. Keller, A. Decloedt and I. Vanwesenbeeck
4. The following authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: P. Keller, A. Decloedt and I. Vanwesenbeeck

Conflict of interest statement

No competing interests.

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Supplementary material

Supplementary data associated with this article can be found, in the online version, at doi: …

Supplementary information 1: Online survey (translated in English)

Supplementary information 2: Structural equation modelling analysis

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Table 1: Study participants' demographics and significant associations with past use of complementary and alternative veterinary medicine based on a multivariable logistic regression model.

Demographics	Past CAVM use in dogs					
	Total (n=1000)	**CAVM users** (n=453)	**CAVM non-users** (n=547)	*Multivariable log-regression*		
	%	**%**	**%**	**OR**	**95% CI**	***P*-value**
Age (years)						
18-30	33.1	19.0	44.8	Ref.		
31-45	32.9	38.9	28.0	1.9	1.2-2.9	0.005
>45	34.0	42.2	27.2	2.2	1.4-3.4	0.001
Gender						
Male	7.9	5.3	10.1			
Female	92.0	94.7	89.8			
X	0.1	0.0	0.2			
Self-use						
No	32.2	10.2	50.5	Ref.		
Yes	67.8	89.9	49.5	7.2	5.0-10.5	<0.001
Education						
High school or lower	33.6	31.1	35.6			
Higher education (non-university)	46.9	52.3	42.4			
University diploma	19.5	16.6	21.9			
Work						
Employee	46.2	40.0	51.4	Ref.		
Self-employed / liberal profession	16.6	26.3	8.6	2.1	1.3-3.3	0.001
Worker	7.9	9.1	6.9	1.5	0.8-2.6	0.168
Not involved in a paid profession	8.6	10.4	7.1	1.5	0.9-2.6	0.110

Student	13.4	5.7	19.7	0.8	0.4-1.4	0.428
Retired	7.3	8.6	6.2	1.2	0.7-2.3	0.476
Dog professional						
No	80.3	71.7	12.6	Ref.		
Yes	19.7	28.3	87.4	2.3	1.5-3.6	<0.001
Alternative therapist						
No	94.2	11.7	99.1	Ref.		
Yes	5.8	88.3	0.9	5.6	2.0-15.8	0.001
Number of dogs						
1	52.0	41.1	61.1	Ref.		
2	30.2	34.4	26.7	1.6	1.1-2.2	0.010
>2	17.8	24.5	12.2	1.7	1.1-2.6	0.020

Figure legends

Fig. 1. Adjusted model of the theory of planned behaviour by Ajzen including perceived knowledge as an extension.

Fig. 2. Frequency of usage among users of complementary and alternative veterinary medicine, expressed as percentage of total number of users for the five categories.

Fig. 3. Overview of the final structural model for predicting the intention to use complementary and alternative veterinary medicine (CAVM). Perceived behaviour control also includes perceived efficacy, harm and benefits.