

Scientific contribution

User Experience of Canine Assistive Mobility Aids

Pavlovic Monika^{1,2*}, Mursec Aljaž¹

1. University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia

2. University of Primorska, Faculty of Health Sciences, Izola, Slovenia

* Correspondence: Monika Pavlovic; monika.pavlovic@zf.uni-lj.si

Abstract: Assistive mobility aids play an important role in the overall well-being, mobility, and activity of animals with neurological and/or orthopaedic impairments. The user experience relates not only to the pet owner, but also to the animal using it. Animals cannot express how they feel when using an assistive mobility aid, so the owner's observation of the animal is of great importance in this case. In this study the experiences of users of mobility aids for dogs were investigated using a questionnaire. All pet owners invited to participate had received a mobility aid (orthosis, prosthesis, or wheelchair) made by us for their pets in the past year. Of fifteen pet owners invited, eight dog owners responded to the questionnaire. The aids used were orthosis (25%), prosthesis (50%) and wheelchair (25%). Our survey shows that most owners (5/8) believe that assistive devices have a very positive impact on their dog's life. To improve the use of mobility aids in animals, future research should focus on making them more accessible. To restore normal limb function after injury, chronic disease or amputation, good collaboration between veterinarians, technicians (orthotists/prosthetists) and owners based on scientific evidence should be encouraged.

Citation: Pavlovic M, Mursec A.
User experience of canine assistive mobility aids. Proceedings of Socratic Lectures. 2023, 8; 30-37.
<https://doi.org/10.55295/PSL.2023.15>

Publisher's Note: UL ZF stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2023 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Keywords: Orthotics; Prosthetics; Wheelchair; Animal; Pet; Dog

1. Introduction

Assistive mobility aids play an important role in the overall well-being, mobility, and activity of animals with neurological and/or orthopaedic impairments. They help animals become independent, support a weak, non-functional or amputated limb, and aid in rehabilitation and movement (Adamson et al., 2005). Their use improves the biomechanics of movement, leading to a more active life and preventing obesity and other related diseases. They significantly reduce pain due to compensatory movement reducing earlier health problems or the need for euthanasia (Borghese et al., 2013). Assistive mobility aids for animals include orthoses, prostheses, and wheelchairs for the front or rear limbs or other injured body parts (Mich PM, 2014).

The user experience refers not only to the animal owner, but also to the animal using it. Animals cannot express how they feel when using an assistive mobility aid, so the owner's observation of the animal is of great importance in this case. The inadequacy of the device is reflected in the animal's (altered) behaviour, such as unusual barking and whining, and skin lesions such as blisters, abrasions, etc. The owner is also responsible for the care of the device and must be consistent in fitting (**Figure 1**). It is also important that he takes enough time to get the animal used to aid itself. Regardless of how good the fitting process is, some animals do not become accustomed to the device (Lee S et al. 2021).

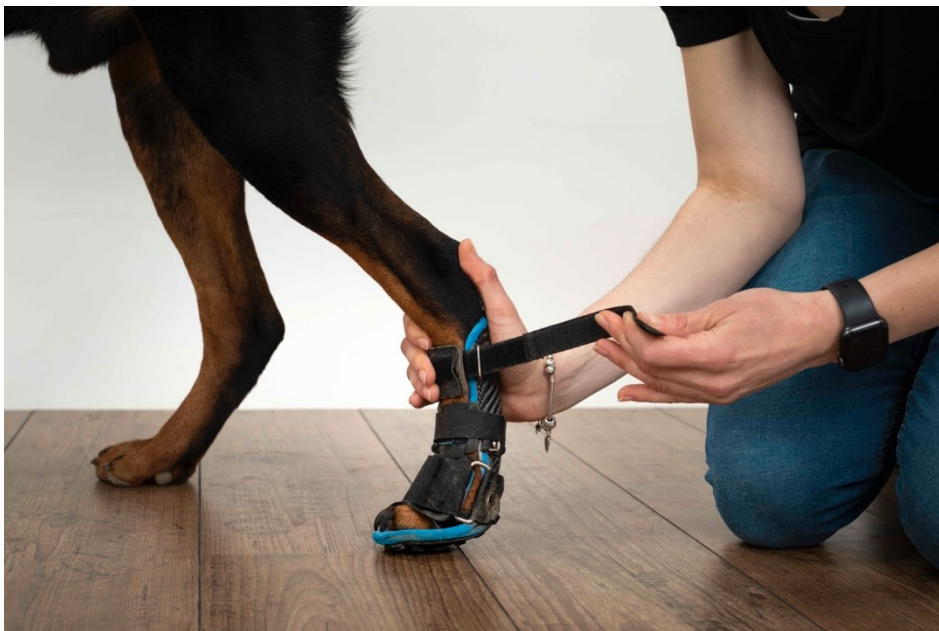


Figure 1: Canine orthosis fitting.

1.1. Assistive mobility aids for pets

Orthotics and prosthetics are medical specialties that are rapidly developing in veterinary medicine as well. The main goal in orthotics is to improve the functionality of the limbs (usually injured), while the goal of prosthetics is to replace body parts after amputation (Mich, 2014). In clinical practice, prosthetic care for pets and other animals is not a routine procedure, but it improves the lives of animals that require such care (Kleinschmidt, 2018). Prosthetic limbs are considered permanent devices that increase mobility and ensure safe use throughout life (Mich, 2014) (**Figure 2**). They are attached to the residual limb and allow physiological movements (Marcellin-Little et al., 2015). With the rapid development and use of new materials, the process of manufacturing assistive mobility aids has changed, and the quality and strength of the products have improved (Keszler et al., 2019). The main function of orthoses is to stabilize joints and provide support to potentially weakened muscle groups (Adamiak et al. 2022). They can be used as a solution before or after surgery, or when surgery is not possible. The orthosis can also be used to immobilize the limb, preventing or reducing the severity of some injuries (Goldberg, 2018). Their use helps in pain management, improves the biomechanics of movement, and thus contributes to a better quality of life for animals (Mich, 2014).

Sometimes due to mobility limitations and medical needs, the age of the animal and its environment, neither orthosis nor prosthesis can help. In this case a subgroup of the assistive mobility aids mentioned above – wheelchairs – can be of great help (McNutt, 2020) (Figure 2). Wheelchairs are also receiving more attention recently and are often used by animals (Charbonneau et al., 2016). They are most often used for chronic or degenerative conditions that worsen over time (McNutt J, 2020).



Figure 2: Canine assistive mobility aids including orthosis (left), wheelchair (middle) and prosthesis (right).

1.2. *The need for assistive mobility aids in animal world*

It has already been shown that the need for assistive mobility aids for animals is high in some European countries. Veterinarians believe that mobility aids affect the quality of life of animals and would recommend such rehabilitation to pet owners. It turns out that there are not enough specialists in orthotics and prosthetics for animals, compared to the number of amputations performed annually. Veterinarians also state that they would be willing to adapt surgical techniques to the purpose of using a mobility aid (Mursec, 2020).

The purpose of this study was to investigate user experiences of custom-made mobility aids for dogs. A questionnaire was used to collect feedback from pet owners on their experiences.

2. **Materials and methods**

Fifteen pet owners (including dogs, cats, and a doe) who received custom-made assistive mobility aids (orthosis, prosthesis or wheelchair) were invited to participate in this study. A total of eight dog owners responded to our questionnaire (Appendix 1). It consists of 21 questions. First basic information such as animal breed, sex, and injured body part was collected. That was followed by questions about the reason and frequency of using assistive mobility aids, satisfaction when the animal was first examined, occurrence of possible difficulties during use, visit to the veterinarian or physical therapist before or after receiving the aid, appearance, price, cleaning of the aid, overall satisfaction, and willingness to recommend a mobility aid to other owners. The rating scale ranged from 1 to 10, with 1 being the lowest rating and 10 being the highest score. An open-ended question was available at the end for any additional comments or suggestions.

All pet owners invited to participate had received our custom-made assistive mobility aids (orthosis, prosthesis, or wheelchair) for their pets in the past year. Prior to treatment of their pets and participation in this study, all pet owners provided written informed consent. Consents were gathered and mobility aids were manufactured between 19th January and 11th October 2022. The study protocol was compliant with the guidelines of the Declaration of Helsinki. The questionnaire was conducted in Slovenian and Croatian, and it was available for participants on 1ka oneclick survey (www.1ka.si) – an open-source applica-



tion that enables online survey services. The invitation to participate was sent to participants via e-mail on October 21, 2022. A reminder to those who have not yet participated was sent on October 24, 2022.

3. Results

A total of eight owners completed the questionnaire; there were five female and three male dogs, four of which were mixed breeds, one Doberman, one medium Poodle, one Rottweiler and one Yorkshire terrier. The most frequently injured body parts were the front (50%) and rear (50%) extremities. In addition, one dog (13%) had injured spine. Half of the pets (50%) wore prostheses, other two quarters (25% each) used orthoses and wheelchairs. The average satisfaction with the pet’s initial examination was 9.4/10, and five/eight dogs had no problems caused by the aids they received. The other three dogs had experienced blisters, unfavourable extremity position and refused to walk with the assistive device. The same three dogs required additional corrections to the aid itself. Only three of eight dogs visited veterinarian or physical therapist before or after receiving the mobility aid.

Assistive mobility aids are used between 30 and 120 minutes per day. Only 13% of our participants walk between 100 and 500 metres per day, 37% manage to walk between one and two kilometres with the mobility aid, 25% take longer walks of more than two kilometres. Display of activity using assistive mobility aids is presented in **Figure 3**. Some owners indicated that they do not use assistive aids for their pets every day. Most owners (38%) clean the mobility aid once a day, others (13% each) clean it more than once a day, once a week, once a month, less than once a month, and some (13%) do not clean it at all.

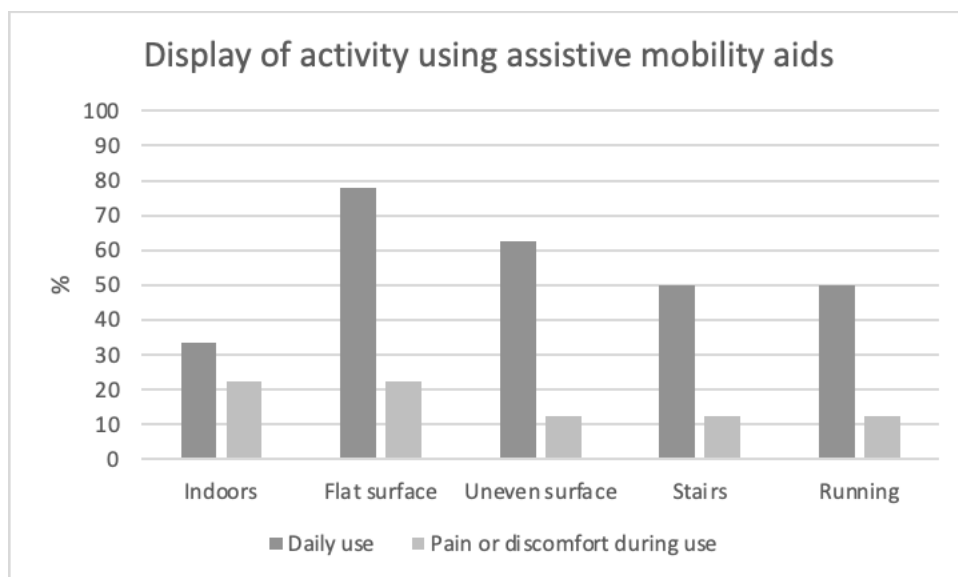


Figure 3: Activities performed using assistive mobility aids.

According to the dog owners’ observation, the aids had a very positive impact on five/eight dogs’ lives. Two rated the influence as somewhat positive and one owner rated the influence as very negative. The average satisfaction with the appearance of the aid was 7.8/10. In general, our respondents seem very satisfied. They indicated that they would most likely (8.7/10) recommend the mobility aid to other owners if their pet needed one. Comments/suggestions on the open-ended question at the end of the questionnaire were positive and were to continue the good work, to develop further, and praise for kindness. It was also suggested to organise a control examination of the animal after a certain period of using the aid.



4. Discussion and conclusion

This study investigated the experiences of users of assistive mobility aids for dogs using a questionnaire. Of fifteen pet owners invited to participate, eight dog owners responded to the questionnaire. The aids used were orthosis (25%), prosthesis (50%) and wheelchair (25%). Daily use was estimated to be 30 to 120 minutes per day.

The ability to provide animals with mobility aids is important for their health and well-being. Mursec A (2020) found that 35.9% of owners choose to euthanize their dog when the only solution for complete recovery is limb amputation. Prosthetic devices can reduce the percentage of unnecessary euthanasia and improve quality of life when overall health state and other key factors allow. Our survey shows that most owners (5/8) believe that assistive devices have a very positive impact on their dog's life. Similar results have been reported in previous studies. Philips A, et al. (2017) demonstrated that 83.3% of owners reported good to excellent quality of life after receiving a prosthesis. In addition, 89.3 % of owners felt that their pet was fully functional with the prosthesis (Wenland et al. 2019). Similar results exist for orthotics. Lee S, et al. (2021) found that 44/56 dog owners perceived positive effects of the orthotic devices on their pet's quality of life. In the same study similar complications were noted after the aid fitting, such as skin sores, pain/sensitivity and swelling. However, most of these complications could be resolved with corrections to the orthosis.

Assistive mobility aids have recently become more common in animals. They do not speak our language, so the biggest difference in satisfaction with assistive devices for humans and animals is that their feedback is mostly based on owner perception. However, the results of previous research, as well as ours, show the assistive aids have a positive impact on the quality of life of dogs and their owners. To improve the use of assistive mobility aids in animals, future research should focus on making them more accessible. To restore normal limb function after injury, chronic disease, or amputation, good collaboration between veterinarians, technicians (orthotists/prosthetists) and owners based on scientific evidence should be encouraged.

Funding: No funding was received for this research.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A - User experience of animal assistive mobility aids questionnaire

References

1. Adamiak Z, Jastrzębski P, Snarska J, Samson L. Orthosis in the conservative treatment of cranial cruciate ligament rupture in dogs – Clinical Observations. *Acta Veterinaria*. 2022; 71: 111-117. DOI: 10.2478/acve-2022-0009
2. Adamson C, Kaufmann M, Levine D, et al. Assistive devices, orthotics, and prosthetics. *Vet Clin North Am Small Anim Pract*. 2005; 35: 1441-1451. DOI: 10.1016/j.cvsm.2005.08.009
3. Borghese I, Fair L, Kaufmann M, et al. Assistive devices, orthotics, prosthetics, and bandaging. In: Zink MC, Van Dyke JB, editors. *Canine sports medicine and rehabilitation*. Chichester, Wiley-Blackwell. 2013; pp. 201-222. DOI: <https://doi.org/10.1002/9781118783443.ch11>
4. Charbonneau R, Sellen K, Seeschaaf Veres A. Exploring Downloadable Assistive Technologies Through the Co-fabrication of a 3D Printed Do-It-Yourself (DIY) Dog Wheelchair. *International Conference on Universal Access in Human-Computer Interaction*. Editors: Antona M, Stephanidis C, 2016; pp. 242-250. DOI: <https://doi.org/10.1007/978-3-319-40250-5>



5. Goldberg ME. Orthotics and the veterinary nurse. IVC Journal. 2018. Available from: <https://ivcjournal.com/orthotics-veterinary-nurse>
6. Keszler MS, Heckman JT, Kaufman GE, Morgenroth DC. Advances in prosthetics and rehabilitation of individuals with limb loss. *Phys Med Rehabil Clin N Am*. 2019; 30: 423-437. DOI: 10.1016/j.pmr.2018.12.013
7. Kleinschmidt LM. The use of prosthetic and orthotic limbs in avian medicine. In: Miller RE, Lamberski N, editors. *Fowler's zoo and wild animal medicine current therapy*. 1st ed. St. Louis: Saunders. 2018; pp. 465-470.
8. Lee S, Wendland TM, Rao S, Magee C. Orthotic Device Use in Canine Patients: Owner Perception of Quality of Life for Owners and Patients. *Front Vet Sci*. 2021; 8: 709364. DOI: 10.3389/fvets.2021.709364
9. Marcellin-Little DJ, Drum MG, Levine D, McDonald SS. Orthoses and exoprostheses for companion animals. *Vet Clin North Am Small Anim Pract*. 2015; 45: 167-183. DOI: 10.1016/j.cvsm.2014.09.009
10. McNutt J. New Leash On Life: Assistive Mobility Aids for Dogs – What to Consider and Why. *Orthopaedic Physical Therapy Practice*. 2020; 32: 247-249.
Available from: https://www.orthopt.org/uploads/OPTP_v32_no4_FINAL.pdf
11. Mich PM. The emerging role of veterinary orthotics and prosthetics (V-OP) in small animal rehabilitation and pain management. *Top Companion Anim Med*. 2014; 29: 10-19. DOI: <https://doi.org/10.1053/j.tcam.2014.04.002>
12. Mursec A. Pogostost amputacij in protetične oskrbe pri psih ter potreba po specialistih protetike za živali. University of Ljubljana, Faculty of Health Sciences. Diploma work. 2022.
13. Philips A, Kulendra E, Bishop E, Monk M, et al. Clinical outcome and complications of thoracic and pelvic limb stump and socket prostheses. *Vet Comp Orthop Traumatol*. 2017; 30: 265–271. DOI: 10.3415/VCOT-16-09-0127
14. Wendland TM, Seguin B, Duerr FM. Retrospective multi-center analysis of canine socket prostheses for partial limbs. *Front Vet Sci*. 2019; 6: 100. DOI: 10.3389/fvets.2019.00100

**Appendix A - User experience of animal assistive mobility aids - Questionnaire**

Short name of the survey: User experience of animal assistive mobility aids

Number of questions: 21

Number of variables: 54

Status: Active from: 17/10/2022 Active until: 30/10/2022

Introduction

Dear participants, the aim of this survey is to find out how satisfied pet owners are with assistive mobility aids for animals. It will take you about 5 minutes to complete the questionnaire. The collected data will be used for scientific contribution. We kindly thank you for your cooperation.

Q1 - Animal breed:**Q2 - Sex of the animal:**

- Female
- Male

Q3 - Your pet's name (optional):**Q4 - Which part of the body is injured?**

Several answers are possible

- Front legs
- Hind legs
- Spine
- Other:

Q5 - Reason for injury:**Q6 - What type of assistive mobility aid does your animal currently use?**

- Orthosis
- Prosthesis
- Wheelchair

Q7 - How satisfied were you as the owner with the first examination and measurement procedure? Rating scale 1 – 10

Q7\2 - If you were dissatisfied, please describe what bothered you:

Q8 - How much time per day does your pet use the aid?

(If they do not use the assistive mobility aid every day, write the number 0 below for the minutes and hours)

_____ minutes
 _____ hrs

Q9 - What activities does your pet perform with the device?

Please mark below

Mark yes, if the device causes pain or discomfort during mentioned activity.

- | | | | |
|-----------------------|------------------------------|-----|----|
| <input type="radio"/> | Walking around the apartment | Yes | no |
| <input type="radio"/> | Walking on flat surface | Yes | no |
| <input type="radio"/> | Walking on uneven surface | Yes | no |
| <input type="radio"/> | Walking up the stairs | Yes | no |
| <input type="radio"/> | Run | Yes | no |

Q10 - How much does your pet walk with the aid on average per day?

- Up to 100 meters (walking around the apartment)
- From 100 to 500 meters
- From 500 meters to 1 kilometer
- From 1 to 2 kilometers (shorter walk)
- more than 2 kilometers
- He doesn't use the gadget every day

Q11 - Did your animal have any difficulties when starting to use the assistive mobility aid?

- Yes



What difficulties were present: _____

- No

Q12 - How has the assistive mobility aid affected your pet's life?

- A very positive influence
- A positive influence to some extent
- No impact
- A somewhat negative influence
- Very negative impact

Q13 - Was rehabilitation or physiotherapy part of your pet's veterinary care before or after receiving the device?

- Before
- After
- Before and after
- We did not receive physiotherapy

Q14 - Did you visit a veterinarian with your pet after receiving the assistive mobility aid?

- Yes

What was the reason for visiting veterinarian: _____

- No

Q15 - Were there any additional corrections needed after first receiving the aid?

- Yes

What corrections were needed? _____

- No

Q16 - How satisfied are you with the appearance of the aid itself? Rating scale 1 – 10

Q17 - Did you pay the expected amount of money for the aid?

- Yes

Have you paid more or less than the estimated amount for the gadget? _____

- No

Q18 - How often do you clean the device?

- Multiple times a day
- Once a day
- Once a week
- Once a month
- Less than once a month
- I do not clean the device

Q19 - How likely is it that you would recommend the manufacture of an assistive mobility aid for pets (if needed) to your friends or acquaintances? Rating scale 1 – 10

Q20 - Is there anything else you would like to tell us? Do you suggest any improvements or ideas?

Please write your answer.
