

Article

Members of the Pod: Do Marine Mammal Trainers Perceive a Bond with the Animals They Care For?

Thomas Welsh^{1,2,*} , Sabrina Brando³ , Geoff Hosey⁴ and Samantha J. Ward² ¹ Askham Bryan College, University Centre Askham Bryan, York YO23 3FR, UK² School of Animal, Rural and Environmental Science, Nottingham Trent University, Nottingham NG25 0QE, UK³ AnimalConcepts, Teulada, 03725 Alicante, Spain⁴ Biology, University of Bolton, Bolton BL3 5AB, UK

* Correspondence: thomas.welsh@askham-bryan.ac.uk

Abstract: Animals under human care interact with their caretakers, potentially resulting in human–animal bonds (HABs), which can enhance wellbeing for both. Previous research has suggested that keepers perceive bonds with their animals, but investigation of a different zoo role working with one species has not yet been completed. Here, we investigate the animal trainers' perception of HABs with captive bottlenose dolphins (*Tursiops truncatus*). A modified Lexington Attachment to Pets Scale (LAPS) was used to measure the strength of perceived HABs between trainers and both dolphins and companion animals in their care. LAPS questionnaires were completed by 128 trainers from 35 different collections worldwide. Most respondents perceived themselves to have a bond with a dolphin, although LAPS scores for attachment to dolphins (DA) were significantly lower than for companion animals (CA). Female LAPS scores were significantly higher than males for both DA and CA. Multiple regression demonstrated that the facility and trainer gender were significant predictors of CA. LAPS scores for trainers were comparable to those for zoo animals, which reflects a strong attachment to the dolphins they work with. However, this attachment was not as strong as for their companion animals, and was influenced by the collection they worked for.

Keywords: human–animal relationship (HAR); dolphin; zoo; attachment; human–animal bond (HAB); companion animal



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1. Introduction

Animals housed in zoos are in regular and sustained contact with a variety of people, ranging from unfamiliar zoo visitors to familiar keepers and trainers [1]. A human–animal interaction (HAI) can be defined as “a sequence in which individual A shows behaviour X to individual B, or A shows X to B and B responds with Y” [2]. Repeated interactions over time between animals and people can lead to the formation of relationships (human–animal relationships, HAR), which can have profound effects on both the animals and the people they have the relationship with, because the net quality of HAIs results in positive, neutral, or negative HARs [3]. It is known that zoo animals can distinguish between familiar and unfamiliar humans [4]. Many species use cues, such as a uniform, to discriminate between possible keepers and visitors [1], whereas some species are known to develop relationships to individual keepers based on their keeping style and the length of time spent working with the animal (for example, black rhinoceros *Diceros bicornis* [5]). This implies that the sorts of relationships that the animals have with unfamiliar people like visitors, if they have them at all, might be different from those they have with familiar people such as keepers and trainers.

The effects of unfamiliar humans on zoo animals have been well studied [6]. The accumulation of net human–animal interactions (HAI) might result in an animal having a generalised response to zoo visitors; however, there is a complexity in studying these

responses due to the range of variables present [7]. Consequently, it is suggested that a HAR can only form between an individual animal and a human known to them [8]. The interactions that zoo animals have with familiar humans are, both qualitatively and quantitatively, more positive than interactions with unfamiliar humans [9], implying that HARs with keepers and trainers are likely to be positive. This could be because the amount and quality of time keepers and the animals in their care spend in proximity to each other allow for more interactions to occur, permitting a HAR [10]. Interactions with keepers tend to be more positive compared to visitors as keepers have received training in the care of the animal and often provide extrinsic reinforcement to the animal, usually in the form of food or providing [11].

Very positive HARs can develop into human–animal bonds (HAB), which can be defined as “a mutually beneficial and dynamic relationship between people and animals that is influenced by behaviours that are essential to the health and well-being of both. This includes but is not limited to, emotional, psychological and physical interactions of people, animals and the environment” [12]. Russow [13] takes this further by suggesting criteria that distinguish a HAB from a HAR, which are: (a) it involves a relationship between a human and an individual animal, (b) it is reciprocal and persistent, and (c) it tends to promote an increase in well-being for both parties.

Most research on HABs has come from the companion animal [6], and, as a result, we know a lot about the strength of attachment of owners to their animals, as well as the benefits that accrue to owners from those attachments. This provides us with a suitable reference point with which to compare zoo HABs [9], as companion animal HABs have been extensively measured using validated questionnaires. They also raise the possibility that zoo-based HABs could have equivalent benefits for keeper health and well-being. Studies on human–companion animal bonds have shown numerous emotional, psychological and health benefits of the bond for the people involved, including reduction in blood pressure and heart rate, and general improved physical health, as well as self-reported reductions in anxiety and depression [14]. Additionally, investigations into the change in brain activity of humans in the presence of a companion animal have suggested that the person was more relaxed and had a lower state of stress [15]. This has led to Dolphin-assisted therapy being used in some facilities, with positive behavioural responses reported in the children post-session [16].

Previous research on perceived bonds with animals has been largely restricted to companion animals, with few zoo-based studies; those that have been conducted in a zoo context have studied zookeepers generally [17,18]. Evidence of HABs occurring in a zoo context started with anecdotal accounts of keepers having special relationships with some animals [19]. However, recent studies now give empirical evidence of the benefits of positive keeper–animal relationships [5,18,20]. Quantitative studies of the occurrence of HABs in the zoo are few [17,18,20], with most such studies using adapted companion animal–human bond questionnaires to gather keeper perceptions of their bonds with the animals they work with. The Lexington Attachment to Pets Scale, LAPS, [21] is a validated questionnaire which has been used to measure the strength of perceived attachment between companion animals and their owners, hence assessing the perceived HAB. LAPS has previously been used in a zoo context by [17,18] to measure perceived HABs between zookeepers and the animals they care for, making comparisons of perceived bonds between the zookeeper and their companion/zoo animal. Research suggests that 92% of keepers surveyed reported having a bond with at least one zoo animal [9]. The authors of [18] reported that across the sample keepers perceived themselves to have a bond with 72 different species from a range of taxonomic groups, mostly mammals, birds, and reptiles. Although there are great differences in characteristics between the species reported, there was no significant difference between the taxa with regards to attachment score.

Research to date has focused on the zookeeper role within zoos, who, although will complete an element of training as a normal part of husbandry practices, typically

work with multiple species and conduct additional duties which results in less time spent with individual animals. Investigations into other specialised zoo roles, such as animal trainers working with one species, have not yet been completed. Here, we investigate the perception of HABs with captive bottlenose dolphins (*Tursiops truncatus*) by their trainers. Being aquatic, dolphins are subject to different housing and husbandry routines to most other zoo-housed mammals [22], and because many captive dolphins are not just exhibited, but also perform interactive encounters or shows, dolphin keepers and trainers (hereafter referred to as trainers) spend a lot more time participating in sustained and intimate interactions with the animals in their role compared to other animal-based zoo roles.

The bottlenose dolphin is the most common cetacean kept under human care [23]. Current Zoological Information Management System (ZIMS) holding figures suggest there are 257 individuals held in Species 360 member zoos around the world [24]. However, this figure is likely to be under-estimated due to many aquatic facilities using alternative animal record keeping systems. The HAIs between trainer and dolphin are quantitatively and qualitatively different from those of other groups of familiar humans, as most HAIs are positive, developing into a positive HAR, which is essential for the successful free-contact management of this species in human care [22,25]. Dolphins have been shown to exhibit anticipatory behaviour towards non-food HAIs occurring, suggesting they are motivated to participate in the HAIs and find them rewarding [26]. Furthermore, dolphins are very attentive to trainer activity occurring around theirs or neighbouring pools, indicating that dolphins perceive HARs with their trainers enriching and so enhancing welfare [27]. Interactions with care staff and trainers can also result in meaningful choice and control to meet the dolphins' own needs and preferences [22,28,29]. The potential benefits of choice and control have been well described [30–32], recently by [33]. Trainer–dolphin interactions can be in formal training sessions, as well as in informal play sessions, which may contribute to positive relationships and bonds, thus enhancing welfare. Play can be studied in a wide variety of species, including whether it is the driving force behind human and animal behaviour [34]. Play has been described as intrinsically reinforcing as well as the result of learning; the authors of [35] and [36] describe empirical studies that have investigated whether play (mostly social play) is rewarding, including circuits and neurotransmitters that underlie the pleasurable aspects of play. The authors of [37] researched the willingness of dolphins to participate in sessions, and showed that important insights into animal wellbeing and health status could be obtained from this. Furthermore, it was found that dolphins perceive human–animal interactions and toys as rewarding contexts, and that dolphins anticipated human–animal interactions more than toy provision, suggesting the dolphins view HAIs as more enriching than being provided with toys [26]. Play, and other interactions with or without objects, can promote the development of bonds, or friendships, and the authors of [38] conclude that both human friendship and animal close social associations are ultimately beneficial, and that the use of the term friendship for animals seems justified.

Thus, we have a large body of evidence showing that companion animal owners have HABs with their pets, the strengths of which can be quantitatively measured; and that these HABs confer both health and well-being benefits on the animal and human partners. There is also growing evidence that the same is true for HABs between zoo-housed animals and their keepers, although the strength of the HABs appears to be lower with these animals [18]. Previous studies of HABs in a zoo context have looked at multiple taxa [17,18], but so far, no study has focused on one species particularly, or has looked at trainers rather than keepers. Owing to the free-contact management of dolphins [39,40] and the evidence of a positive HAR with the trainer [26], it is feasible that the dolphin–trainer relationship could be considered as a HAB. The aim of this study is to assess the perceived HAB of dolphin trainers to the animals in their care and compare this to their attachment to a companion animal. Alongside assessing perceived attachment, the study also aimed to determine which factors influence strength of attachment, such as location, gender, and

time employed as a trainer. This builds on previous work regarding perceived bonds to zoo animals and potential benefits to both parties.

2. Materials and Methods

2.1. Survey Design

The Lexington Attachment to Pets Scale uses 23 statements about the perceived relationship between the person and an individual or small group of animals. For each statement the respondent can choose from four responses (“strongly agree”, “somewhat agree”, “somewhat disagree”, “strongly disagree”). As with [17], the wording of the dolphin attachment questionnaire statements for this study was modified from ‘pet’ to ‘animal’. The 23 statements in the LAPS questionnaire can be subdivided into those which address the respondent’s general attachment, some which address their use of bonds with their animals as a substitute for bonds with people, and the remainder addressing their animal rights/animal welfare attitudes. The questionnaire contained three sections: Section A contained the modified LAPS regarding the dolphins in their care; Section B contained the original LAPS regarding a companion animal; and Section C asked general demographic information including gender, age group, home country, how long they had been employed as a trainer, how long they had known the individual animals, and whether they considered it professionally appropriate for animal trainers to have bonds with dolphins. Trainers must have been employed as a dolphin trainer in any facility worldwide to participate.

The study was approved by the NTU ARES ethics committee with approval no: ARE859. Respondents were provided with the opportunity to withdraw through contacting the researchers, responses were collected anonymously with no financial incentives provided for participation in the study.

2.2. Data Collection

The questionnaire was transcribed onto the Bristol Online Survey (BOS) [41] platform to allow for completion electronically. Paper copies were also sent to three facilities that had already agreed to participate in the study. Facilities housing dolphins in human care were found using Cetabase, through the European Association of Aquatic Mammals (EAAM) and membership of the AMMPA, with an email sent to the relevant department, containing a link to the questionnaire for trainers to complete. The questionnaire link was also sent through an email sent by EAAM to members on behalf of the researcher. The electronic questionnaire was available for completion between November 2018 and June 2019.

2.3. Data Analysis

Responses to the LAPS statements were coded as: 0 = strongly disagree, 1 = somewhat disagree, 2 = somewhat agree and 3 = strongly agree. Scores were reversed for the two statements “I am not very attached to my pet/the animal” and “I think my pet is just a pet/I think the dolphin is just an animal” in accordance with the original LAPS questionnaire design [21]. Analyses were completed using SPSS 25 [42]. Scores for the dolphin questionnaire were normally distributed, but not for the pet questionnaire. Comparison of scores between the pet and dolphin questionnaire were completed using a related-samples Wilcoxon signed rank test, with comparisons between genders of respondents analysed using a 2-sample *t*-test (dolphin) and Mann-Whitney U test (pet). A multiple regression was used on the dolphin attachment scores using the scores as the dependent variable, and location, sex, length of time as a trainer, length of time they had known the animal, and age as predictor variables.

3. Results

3.1. Respondents

In total, 128 dolphin trainers (males $n = 27$, females $n = 98$, prefer not to say $n = 3$) completed the questionnaire from 35 different zoo collections. Of these, most ($n = 107$) were in the age range 20–40 years, with one < 20 years and 21 of them > 40 years. Most

respondents ($n = 116$) considered themselves to have a bond with a marine mammal in their care and so completed the modified LAPS questionnaire; a majority ($n = 101$) also had a companion animal and so also completed the original LAPS questionnaire. Most respondents ($n = 125$) thought it professionally appropriate for trainers to have bonds, while three thought it was not appropriate.

3.2. Comparisons and Multiple Regression

Across the sample, mean scores for companion attachment (52.98 ± 1.29) were significantly higher than dolphin attachment (48.22 ± 1.25 ; $W = 4.623$, $N = 83$, $p < 0.001$). Female trainers scored significantly higher in dolphin attachment (50.06 ± 1.09) than males (40.9 ± 2.32 ; $t_{105} = 3.696$, $p < 0.01$). This was also the case for companion attachment, with females scoring significantly higher (56.06 ± 1.21) than males (41.33 ± 3.10 ; $U = 221$, $N = 27.98$, $p < 0.01$) (Figure 1).

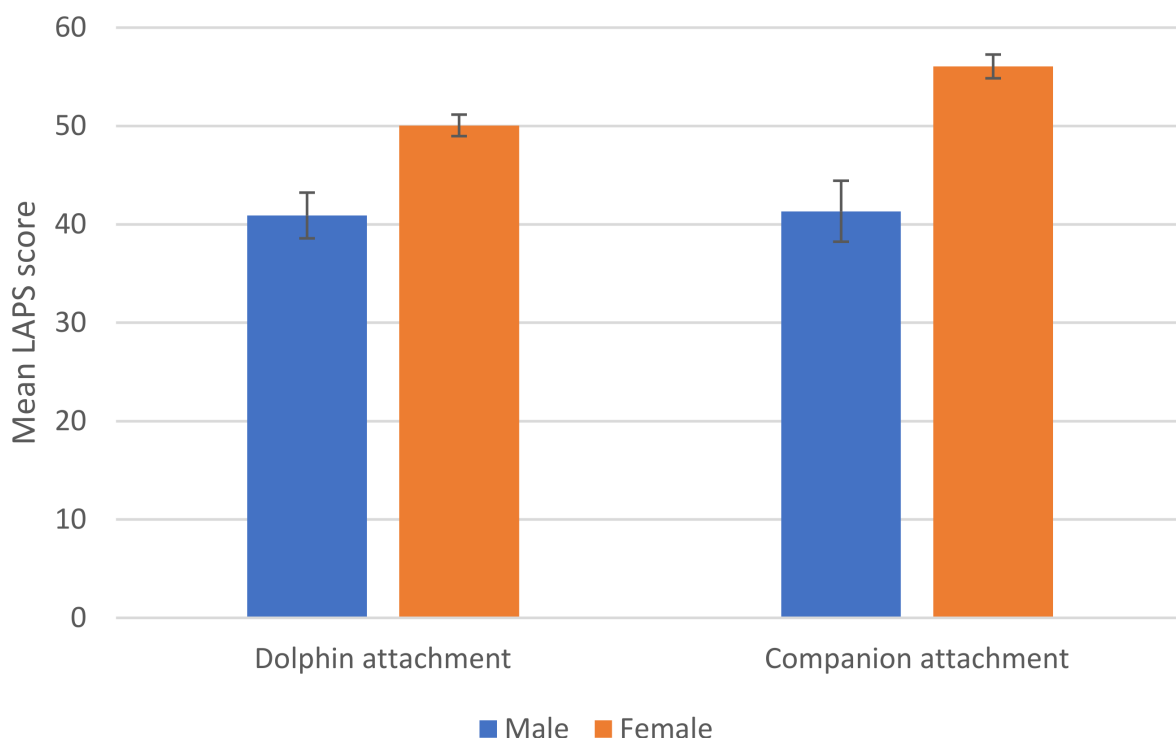


Figure 1. Mean dolphin and companion attachment scores ($n = 27, 89, 25, 76$).

When separated into the three sub-groups of the LAPS (General attachment, people substituting and animal rights/animal welfare), there was no significant difference between dolphin and companion for general attachment ($W = 11,894.5$, $N = 111.97$, $p = 0.495$), or people substituting ($W = 12,757.5$, $N = 111.97$, $p = 0.34$); however, there was a significant difference in the animal rights/animal welfare sub-group, with mean companion scores (12.13 ± 0.242) being significantly higher than the dolphin (8.839 ± 0.23) ($W = 8145.5$, $N = 111.97$, $p < 0.001$) (Figure 2).

Location of facility and trainer gender were found to be significant predictors of dolphin attachment score (multiple regression, location $p < 0.01$, gender $p < 0.01$, $R^2 = 48.5\%$). The length of employment as a trainer, amount of time the animal was known, and age were not found to affect dolphin attachment score. Mean dolphin attachment scores per facility ranged from 23.25–64 (Figure 3), excluding facilities where the respondents did not feel bonds were professionally appropriate and so did not complete the LAPS. Although it is clear that there are differences in attachment score between facilities, due to limited respondents from some facilities, inferential statistics were not possible.

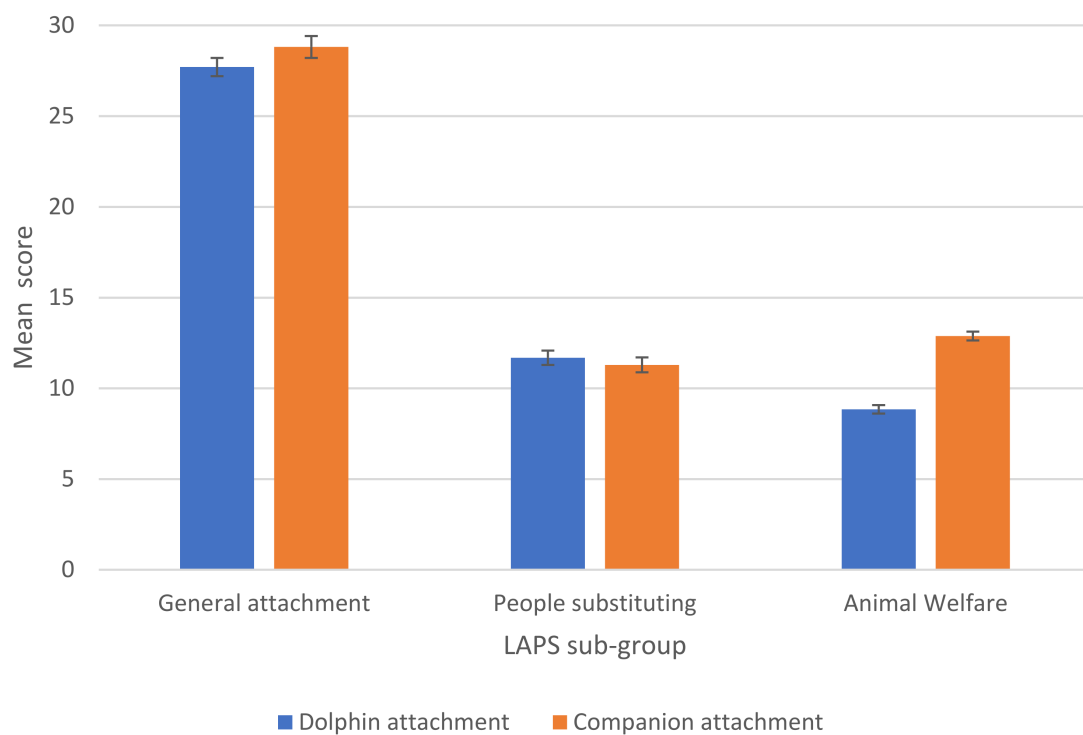


Figure 2. Mean dolphin and companion attachment scores separated by sub-group.

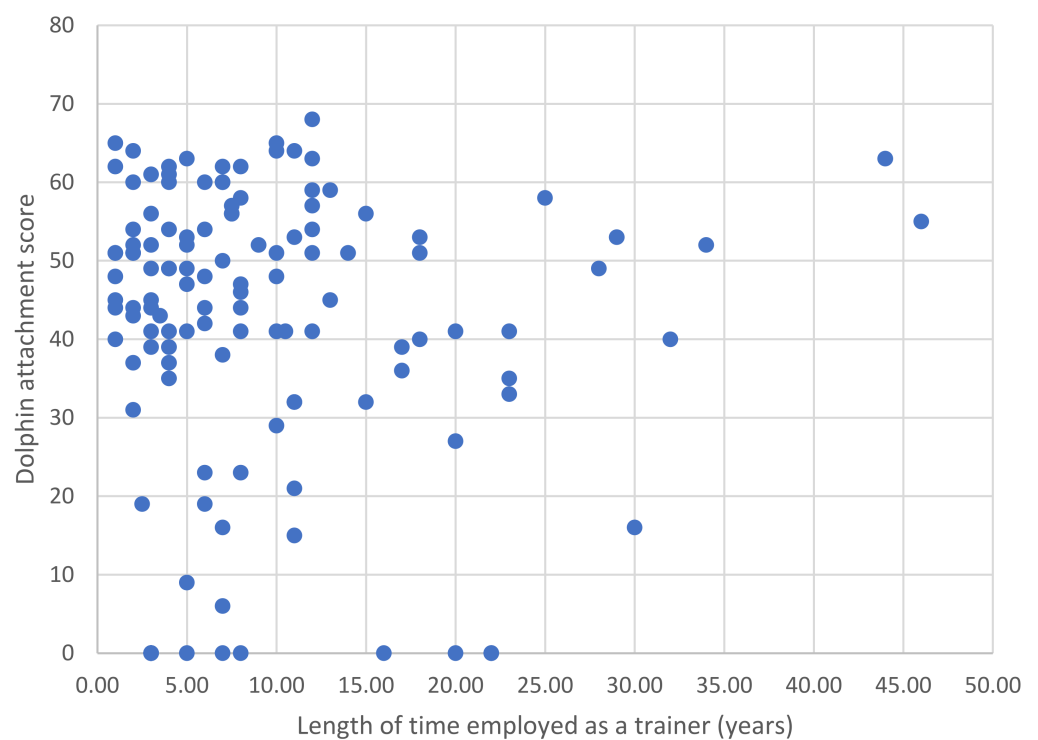


Figure 3. Relationship between length of time employed as a trainer and LAPS dolphin attachment score ($n = 125$).

There was no significant correlation between the length of time employed as a trainer and dolphin attachment score ($r_a = -0.055$, $N = 125$, $p = 0.543$) (Figure 3).

4. Discussion

A large number of the trainers who completed the survey (91%: 116 out of 128) perceived that they had a bond with a marine mammal in their care, which supports previous studies on perceived attachment of zoo professionals to animals [9,17,18]. Although trainers reported having a bond with a marine mammal, their scores for dolphin attachment (DA; 48.22 ± 1.25) were lower than those for companion attachment (CA: 52.98 ± 1.29), suggesting that the trainer's attachment for their companion animal was stronger than their attachment for the marine mammals they worked with. This is consistent with results for zoo-housed animals. A survey across 19 different collections [18] found LAPS scores with zoo animals of 41.91, and of 50.87 with companion animals, which are lower than the scores in this study, but, nevertheless, within a comparable range. The high DA scores in this study may be surprising, given the fact that the dolphins occupy a very different environment from most zoo animals [40]. However, the opportunities for HAB development are different. Captive dolphins are dependent on care professionals and trainers for access to their food, environmental enrichment, and other activities that enrich their lives. While dolphins and people occupy space differently, there are many moments throughout the day that dolphins and their carers come together partly on land and together in the water. While not explicitly investigated in this study, marine mammal trainers in the participating facilities interact with the dolphins for training sessions, presentations and shows daily, 365 days per year. They are managing the animals and interacting with them throughout the day, including feeding and play sessions, as well for educational and research activities, shifting them between pools, and assessing how to house the animals overnight based on daily social interaction between the animals, as well as with them and observing the animal's behaviours while they are interacting with visiting public. Depending on experience, trainers can manage multiple dolphins, and/or supervise other trainers, and in most facilities marine mammal trainers have a high level of autonomy working with the animals [22,28,40]. Many dolphins in human care are involved in swim-with-dolphin programmes [27] and in shows and educational programs, as well as research [28,40,43], which means they spend considerable amount of time with human care professionals/trainers. Dolphins are trained to participate in voluntary care, such as shifting, weighing, and blood draw, for educational presentations and shows, including jumps, fast swims, and waterwork together with trainers (e.g., coordinated swims and dives). Training and working together, with the use of positive reinforcement, objects, as well as social play and interactions, can all contribute to the development of positive HABs. Within the three sub-groups of the LAPS questionnaires (general attachment, people substituting and animal welfare), the higher CA scores for welfare are also consistent with what has been found in zoos [18], though the DA and CA scores for the other two subgroups were not significantly different, unlike those in zoos. It is likely that this, again, reflects the different and more intense relationships that dolphins and their trainers have in comparison with those experienced by keepers of non-marine mammals.

The CA scores in this study are comparable for those of zookeepers reported by [18]. They are also comparable to those in the literature for the population as a whole. The authors of [21] reported attachment scores of 49.2 for dog owners and 45.1 for cat owners. However, other studies in society have reported scores as high as 56.5 for dog walkers [44]. Thus, as with the zookeepers, CA scores are similar to those in the population, while attachment to zoo animal scores are a little lower. These differences may be due to both quantitative and qualitative differences in the HAIs occurring between the trainer and the two categories of animals.

Typically, trainers will spend more time with their companion animal than the marine mammal, allowing more opportunities for HAIs to occur and a sense of attachment to develop; and although trainers will spend a proportionally large time of their week in the workplace, there is the possibility that HAIs with the marine mammal are reduced due to other duties required of the employee [17]. The length of interactions and their structure may also be a factor influencing attachment. HAIs occurring with marine mammals will

typically be structured with set outcomes and a time limit to the interaction, whereas HAIs with companion animals are less structured, do not necessarily have time limits, and the individual has more freedom to decide what HAIs occur. Marine mammal trainers are not only concerned with the correct application of behavioural learning principles, but they also pay attention to and consider the effect of human body language, posture, and communication on the animals in their care [22].

Qualitatively, the environment in which the interactions occur may also influence the sense of attachment. HAIs with marine mammals occur exclusively in the workplace, which has additional pressures for trainers, including meeting daily deadlines, ensuring guest satisfaction, and ensuring they are always working with the animals in a professional manner. The home environment, where most HAIs with companion animals occur, could be considered more relaxed. The absence of pressures in this environment would improve the individual's mental wellbeing, making the trainer more receptive to becoming attached to the companion animal and the opportunity for a HAB to form [18,20]. Most pet owners consider the animals to be family members, which could add to this receptiveness [45]. The perspective of the trainer towards each animal may also be different; for example, having a sense of ownership of the companion animal which has increased attachment compared to a sense of guardianship over the marine mammal.

Like other animal care professionals, dolphin trainers have a high sense of responsibility and feelings of ownership for the animals they work with. Since the release of the films *Blackfish* and *The Cove*, some marine mammal care professionals have stated that they are no longer comfortable talking about their real jobs (personal communications, Brando), and the enormous pressures on the marine mammal community might be a reason that they are hesitant to admit about having a bond with their animals. Some people, including curators and other managers, may find it inappropriate to speak about having a bond with animals (personal observations, Brando) and the effect of distance and appropriateness plays a larger part than people are willing to report and or admit to.

Female trainers scored significantly higher for both pet and dolphin attachment scores than males (Figure 1). This is comparable to what has been seen in studies examining attachment to both companion and zoo animals by their keepers [18]. The difference between the sexes could be due to an underlying willingness to form bonds with the dolphins and be willing to report a stronger attachment. Sex and location (i.e., facility) were significant predictors of dolphin attachment score, this may be due to sex differences with regards to openness to forming an attachment, but also managerial husbandry differences and the way society considers human–animal relationships and attachment to animals as individuals. The management styles of individual facilities may also influence attachment, as some may view dolphins in a professional capacity and, therefore, resist forming emotional connections with the animals, as that could influence their professional judgement, which has been reported in a lab context [46]. However, most respondents thought that trainers having a bond with the animals in their care was professionally appropriate, suggesting that this is a sector-wide trend and provides more evidence for the presence of a HAB in a zoo context. It is known that keeper perceptions towards animals can have positive implications for welfare [5] and staff wellbeing [17]. The management of dolphins under human care is different from that of other zoo animals, as most participate in extensive husbandry routines [22] and often in presentations and visitor experiences. It could be assumed that due to these husbandry practices dolphins spend more time with familiar humans than other zoo animals will. They are also charismatic mammals which will influence human interest in interacting with the species [47].

It is clear that trainers perceive themselves to have a strong positive relationship with the animals in their care, with evidence that positive HARs can enhance welfare, although for this to be determined in this context, further research is required from the animals' perspective. Nonetheless, an individuals' sense of attachment will influence their attitude and behaviour towards an animal, which in turn will influence how the animal perceives and interacts with that individual; this has implications for animal welfare [5]. There is

evidence from companion literature that HABs provide human wellbeing benefits [14] and potentially enhanced welfare for the animals involved [48]; therefore, there is scope that this could also be the case for zoo animals.

The current study has provided the first empirical data for perceived attachment between trainers and a single taxon, and between trainers and an aquatic mammal in a zoo context. However, as a HAB can be defined as a mutually beneficial relationship, further research is required on the quality of the interactions that are occurring and the benefits for both parties.

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Data Availability Statement: Data are available upon request to the corresponding author.

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References

1. Martin, R.A.; Melfi, V. A Comparison of Zoo Animal Behavior in the Presence of Familiar and Unfamiliar People. *J. Appl. Anim. Welf. Sci.* **2016**, *19*, 234–244. [\[CrossRef\]](#)
2. Hinde, R.A. On describing relationships. *J. Child Psychol. Psychiatry* **1976**, *17*, 1–19. [\[CrossRef\]](#) [\[PubMed\]](#)
3. Hosey, G. A preliminary model of human–animal relationships in the zoo. *Appl. Anim. Behav. Sci.* **2008**, *109*, 105–127. [\[CrossRef\]](#)
4. Carlstead, K. A comparative approach to the study of Keeper–Animal Relationships in the zoo. *Zoo Biol.* **2009**, *28*, 589–608. [\[CrossRef\]](#)
5. Ward, S.J.; Melfi, V. Keeper–Animal Interactions: Differences between the Behaviour of Zoo Animals Affect Stockmanship. *PLoS ONE* **2015**, *10*, e0140237. [\[CrossRef\]](#) [\[PubMed\]](#)
6. Hosey, G.; Melfi, V. Human–Animal Interactions, Relationships and Bonds: A Review and Analysis of the Literature. *Int. J. Comp. Psychol.* **2014**, *27*, 117–142. [\[CrossRef\]](#)
7. Rose, P.E.; Scales, J.S.; Brereton, J.E. Why the “Visitor Effect” Is Complicated. Unraveling Individual Animal, Visitor Number, and Climatic Influences on Behavior, Space Use and Interactions with Keepers—A Case Study on Captive Hornbills. *Front. Vet. Sci.* **2020**, *7*, 236. [\[CrossRef\]](#) [\[PubMed\]](#)
8. Patel, F.; Whitehouse-Tedd, K.; Ward, S.J. Redefining human–animal relationships: An evaluation of methods to allow their empirical measurement in zoos. *Anim. Welf.* **2019**, *28*, 247–259. [\[CrossRef\]](#)
9. Hosey, G.; Melfi, V. Human–Animal Bonds Between Zoo Professionals and the Animals in Their Care. *Zoo Biol.* **2012**, *31*, 13–26. [\[CrossRef\]](#)
10. Patel, F.; Wemelsfelder, F.; Ward, S.J. Using Qualitative Behaviour Assessment to Investigate Human–Animal Relationships in Zoo-Housed Giraffes (*Giraffa camelopardalis*). *Animals* **2019**, *9*, 381. [\[CrossRef\]](#)
11. Ward, S.J.; Sherwen, S.; Clark, F.E. Advances in Applied Zoo Animal Welfare Science. *J. Appl. Anim. Welf. Sci.* **2018**, *21* (Suppl. S1), 23–33. [\[CrossRef\]](#)
12. AVMA Committee on the Human–Animal Bond. Statement on the human–animal bond. *J. Am. Vet. Med. Assoc.* **1998**, *212*, 1675.
13. Russow, L.M. Ethical Implications of the Human–Animal Bond in the Laboratory. *ILAR J.* **2002**, *43*, 33–37. [\[CrossRef\]](#)
14. Beetz, A.; Uvnäs-Moberg, K.; Julius, H.; Kotrschal, K. Psychosocial and Psychophysiological Effects of Human–Animal Interactions: The Possible Role of Oxytocin. *Front. Psychol.* **2012**, *3*, 234. [\[CrossRef\]](#)

15. Sugawara, A.; Masud, M.M.; Yokoyama, A.; Mizutani, W.; Watanuki, S.; Yanai, K.; Itoh, M.; Tashiro, M. Effects of Presence of a Familiar Pet Dog on Regional Cerebral Activity in Healthy Volunteers: A Positron Emission Tomography Study. *Anthrozoös* **2012**, *25*, 25–34. [\[CrossRef\]](#)
16. Dilts, R.; Trompisch, N.; Bergquist, T.M. Dolphin-Assisted Therapy for Children with Special Needs: A Pilot Study. *J. Creat. Ment. Health* **2011**, *6*, 56–68. [\[CrossRef\]](#)
17. Hosey, G.; Birke, L.; Shaw, W.S.; Melfi, V. Measuring the Strength of Human–Animal Bonds in Zoos. *Anthrozoös* **2018**, *31*, 273–281. [\[CrossRef\]](#)
18. Melfi, V.; Skyner, L.; Birke, L.; Ward, S.J.; Shaw, W.S.; Hosey, G. Furred and feathered friends: How attached are zookeepers to the animals in their care? *Zoo Biol.* **2021**, *41*, 122–129. [\[CrossRef\]](#)
19. Hediger, H. *Man and Animal in the Zoo: Zoo Biology*, 1st ed.; Routledge & Kegan Paul: London, UK, 1970.
20. Birke, L.; Hosey, G.; Melfi, V. “You Can’t Really Hug a Tiger”: Zookeepers and Their Bonds with Animals. *Anthrozoös* **2019**, *32*, 597–612. [\[CrossRef\]](#)
21. Johnson, T.P.; Garrity, T.F.; Stallones, L. Psychometric Evaluation of the Lexington Attachment to Pets Scale (Laps). *Anthrozoös* **1992**, *5*, 160–175. [\[CrossRef\]](#)
22. Brando, S. Advances in Husbandry Training in Marine Mammals Care Programs. *J. Comp. Psychol.* **2010**, *23*, 777–791.
23. World Animal Protection. *Behind the Smile—The Multi-Billion Dollar Dolphin Entertainment Industry*; World Animal Protection: London, UK, 2019.
24. ZIMS Species Holdings. Species360 Zoological Information Management System. Available online: <http://zims.species360.org/> (accessed on 30 June 2022).
25. Clegg, I.L.K.; Rödel, H.G.; Cellier, M.; Vink, D.; Michaud, I.; Mercera, B.; Böye, M.; Hausberger, M.; Lemasson, A.; Delfour, F. Schedule of human-controlled periods structures bottlenose dolphin (*Tursiops truncatus*) behavior in their free-time. *J. Comp. Psychol.* **2017**, *131*, 214–224. [\[CrossRef\]](#) [\[PubMed\]](#)
26. Clegg, I.L.K.; Rödel, H.G.; Boivin, X.; Delfour, F. Looking forward to interacting with their caretakers: Dolphins’ anticipatory behaviour indicates motivation to participate in specific events. *Appl. Anim. Behav. Sci.* **2018**, *202*, 85–93. [\[CrossRef\]](#)
27. Brando, S.; Kooistra, N.; Hosey, G. Pre and Post Session Behaviour of Captive Bottlenose Dolphins *Tursiops truncatus* involved in “Swim-with-Dolphin” Events. *J. Zoo Aquar. Res.* **2019**, *7*, 195–202.
28. Brando, S.; Broom, D.M.; Acasuso-Rivero, C.; Clark, F. Optimal marine mammal welfare under human care: Current efforts and future directions. *Behav. Processes* **2018**, *156*, 16–36. [\[CrossRef\]](#)
29. Brando, S. Box B4: Marine mammal training. In *Zoo Animal Learning and Training*; John Wiley & Sons Ltd.: Hoboken, NJ, USA, 2020; pp. 197–201.
30. Chamove, A.S.; Anderson, J.R. Examining environmental enrichment. In *Housing, Care and Psychological Wellbeing of Captive and Laboratory Primates*; Segal, E.F., Ed.; Noyes Publications: Park Ridge, NJ, USA, 1989; pp. 183–202.
31. Brando, S. Exploring choice and control opportunities applied in enrichment and training. In Proceedings of the International Conference on Environmental Enrichment, Torquay, UK, 31 May–5 June 2009.
32. Snowdon, C.T.; Savage, A. Psychological well-being of captive primates: General considerations and examples from calitrichids. In *Housing, Care and Psychological Wellbeing of Captive and Laboratory Primates*; Segal, E.F., Ed.; Noyes Publications: Park Ridge, NJ, USA, 1989; pp. 75–88.
33. Allard, S.; Bashaw, M.J. Empowering zoo animals. In *Scientific Foundations of Zoos and Aquariums: Their Role in Conservation and Research*; Cambridge University Press: Cambridge, MA, USA, 2019.
34. Burghardt, G.M. *The Genesis of Animal Play: Testing the Limits*; MIT Press: Cambridge, MA, USA, 2005.
35. Panksepp, J. *Affective Neuroscience: The Foundations of Human and Animal Emotions*; Oxford University Press: Oxford, UK, 2004.
36. Vanderschuren, L.J. How the brain makes play fun. *Am. J. Play* **2010**, *2*, 315–337.
37. Clegg, I.L.; Rödel, H.G.; Mercera, B.; van der Heul, S.; Schrijvers, T.; de Laender, P.; Gojceta, R.; Zimmiti, R.; Verhoeven, E.; Burger, J.; et al. Dolphins’ willingness to participate (WtP) in positive reinforcement training as a potential welfare indicator, where WtP predicts early changes in health status. *Front. Psychol.* **2019**, *10*, 2112. [\[CrossRef\]](#)
38. Massen, J.; Sterck, E.; de Vos, H. Close social associations in animals and humans: Functions and mechanisms of friendship. *Behaviour* **2010**, *147*, 1379–1412. [\[CrossRef\]](#)
39. Brando, S. Wild animals in entertainment. In *Animal Ethics in the Age of Humans*; Springer: Cham, Switzerland, 2016; pp. 295–318.
40. Brando, S. Marine mammals. In *Routledge Handbook of Animal Welfare*; Knight, A., Phillips, C., Sparks, P., Eds.; Routledge: Abingdon, UK, 2022.
41. Jisc. *Online Surveys: Formerly BOS*; Jisc: Bristol, UK, 2019.
42. IBM Corporation. *IBM SPSS Statistics Version 25*, 25th ed.; IBM Corporation: Armonk, NY, USA, 2017.
43. Brando, S.; Bowles, A.E.; Böye, M.; Dudzinski, K.M.; van Elk, N.; Lucke, K.; McBain, J.; Singer, R.; Wahlberg, M. Proceedings of Marine Mammal Welfare Workshops Hosted in the Netherlands and the USA in 2012. *Aquat. Mamm.* **2016**, *42*, 392–416. [\[CrossRef\]](#)
44. Stephens, M.B.; Wilson, C.C.; Goodie, J.L.; Netting, F.E.; Olsen, C.H.; Byers, C.G. Health Perceptions and Levels of Attachment: Owners and Pets Exercising Together. *J. Am. Board Fam. Med.* **2012**, *25*, 923–926. [\[CrossRef\]](#)

-
45. Walsh, F. Human-Animal Bonds II: The Role of Pets in Family Systems and Family Therapy. *Fam. Process* **2009**, *48*, 481–499. [[CrossRef](#)]
 46. Coleman, K. Caring for nonhuman primates in biomedical research facilities: Scientific, moral and emotional considerations. *Am. J. Primatol.* **2011**, *73*, 220–225. [[CrossRef](#)]
 47. Albert, C.; Luque, G.M.; Courchamp, F. The twenty most charismatic species. *PLoS ONE* **2018**, *13*, e0199149. [[CrossRef](#)]
 48. Rault, J.-L.; Waiblinger, S.; Boivin, X.; Hemsworth, P. The Power of a Positive Human–Animal Relationship for Animal Welfare. *Front. Vet. Sci.* **2020**, *7*, 590867. [[CrossRef](#)]