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Human-Animal Co-sleeping Practices among Australian Dog Owners

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Human-animal co-sleeping is relatively common among dog owners; however, the nature of this practice is not well understood. Recent investigations have focused on the impact of human-dog co-sleeping on human sleep but have largely ignored the contextual nature of the practice, including with whom, why, and how people share their beds and bedrooms with their dogs. We explored the nature of human-dog co-sleeping among a large population of Australian dog owners (n = 1136). Nearly half (49%) of participants reported sleeping with their dog in their bed, 20% indicated their dog slept in their bedroom but not in their bed, and 31% reported their dog slept outside their bedroom. The likelihood of bedsharing with one's dog increased with participant age and bed size and was higher for individuals with small dogs than those with larger dogs. In addition, bedsharing with one's dog was more common among individuals who did not have a human bed partner. For each unit increase in the MDORS Dog-Owner Interaction scale, the odds of sleeping with one's dog increased by 1.39, and for each unit increase in the MDORS Emotional Closeness sub-scale, the odds increased by 1.08. For each unit increase in the MCPQ-R Motivation sub-scale, the odds of sleeping with one's dog increased by 1.21.We found no association between whether the dog slept on the bed and self-reported sleep quality. However, participants whose dog slept somewhere other than their owner's bed were 1.45 times more likely to report frequently waking up tired. Bedsharing appears unlikely to impact sleep quality negatively in any meaningful way. In fact, in many cases, dog(s) in the bed may facilitate a more restful night's sleep than when they sleep elsewhere.

Key words: bedsharing; co-sleeping; dogs; sleep; sleep habits

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Dog ownership is common around the world, as evidenced by a recent study of twenty-two countries across five continents that found that dogs resided in one-third of households (GfK, 2016). Relationships between dogs and their human caregivers are commonly characterized not only by close physical proximity but also by close emotional connections (Dwyer et al., 2006; Payne et al., 2015). Numerous studies have explored how these close physical and emotional associations with dogs and other pets impact human health, focusing largely on the ways pets may promote physical activity, cardiovascular health, and psychological health (Barker & Wolen, 2008; Christian et al., 2013; Friedmann & Son, 2009; Walsh, 2009).

Studies of humans' relationships with their companion animals have almost exclusively focused on the ways people engage with their pets during their waking hours, yet people commonly spend their sleeping hours with pets in their bed or bedroom (Hoffman et al., 2018; Smith et al., 2014, 2017). Despite the importance of sleep to human health (Kryger et al., 2010), only a small body of research has investigated human-dog co-sleeping, defined as sharing one's bed or bedroom with one's dog. Much of this research has relied upon self-reported survey data. Physiological and behavioral differences between humans and dogs suggest human-dog co-sleeping may be disruptive to human sleep (Adams & Johnson, 1994; Smith et al., 2018), and survey data indicate that dogs create sleep disruptions for some human-dog dyads, including increasing the time it takes individuals to fall asleep and the likelihood of waking up tired (Smith et al., 2014). Nevertheless, individuals who co-sleep with their dogs commonly report that the practice conveys psychological benefits, such as helping them feel more relaxed and secure (Brown et al., 2018; Hoffman et al., 2018; Krahn et al., 2015; Smith et al., 2014).

Three recent studies used actigraphy to explore how human-dog co-sleeping impacts human sleep efficiency, and each provided evidence that co-sleeping with a dog is associated with reduced sleep efficiency, particularly when dog and human share a bed (Hoffman et al., 2020; Patel et al., 2017; Smith et al., 2018). Furthermore, one of those studies compared bedsharing dogs' and humans' nighttime actigraphy data minute-by-minute and found that humans rarely recall dogs' nighttime movements (Hoffman et al., 2020). Nevertheless, participants' self-reported ratings of each night's sleep were closely associated with both human and dog night-time movement, as recorded via actigraphy.

All the survey- and actigraphy-based human-dog co-sleeping studies to date have been correlational in nature. That is, participants in all studies determined whether their dogs slept on their bed, in their bedroom, or outside their bedroom. Little is known, however, about the wider contextual nature of the practice. For example, why do some people choose to allow their dog onto their bed, and why might they continue? Presumably, characteristics of an individual's household, their relationship with their dog, their personality, and their dog's personality are factors that may influence where the dog sleeps. For instance, individuals who sleep on a small bed may not be as inclined to allow their dog onto the bed. Those who share their bed with another human may also be less inclined to allow their dog onto the bed, particularly since one partner may not welcome the idea of a dog on the bed (Thompson & Smith, 2014). Furthermore, humans' relationships with their dogs vary greatly (Blouin, 2013; Dwyer et al., 2006), and those

who have a particularly close relationship with their dog may be more likely to share their bed.

Owners' personality traits may also impact their tendencies to bedshare. Individuals' scores on the Big Five personality dimension neuroticism are positively associated with the degree to which they view their dog as an important source of social support, and owner extraversion is positively associated with owner appreciation of shared activities with the dog (Kotrschal et al., 2009). Thus, owners' scores on measures of neuroticism and extraversion might be associated with their tendencies to allow their dog on the bed. Dog characteristics, such as size, age, and personality, also may impact the likelihood of bedsharing. For instance, dogs vary in their self-assuredness and motivation (Ley et al., 2009), and when it comes to bedsharing, owners may acquiesce to tenacious dogs who routinely jump on the bed despite being uninvited, or incessantly bark or whine when banished from the bed or bedroom. Thus, the decision to bedshare with a dog could be a reactionary response rather than a deliberate one, much like many parent-child co-sleeping arrangements (Smith et al., 2017).

To identify factors that predict human-dog bedsharing and develop an understanding of why dog owners commonly report that sleeping with their dog is a positive experience, we collected self-report data from a sample of Australian dog owners. Specifically, we set out to identify whether human, dog, and household factors, as well as characteristics of the human-dog relationship, were associated with where the dog sleeps. Additionally, we explored whether there is an association between whether the dog routinely sleeps in the bed and subjective reports of sleep quality.

Methods

Participants

We recruited Australian residents to participate in our online survey using advertisements on pet forums and social media sites, including Facebook and Twitter. To ensure we captured responses from dog owners, we targeted Facebook interest groups relating to dog ownership, such as rescue and breeder groups. We encouraged those who completed the survey to share the survey link with other friends and/or family who owned a dog.

Measures and Procedures

We constructed and hosted our survey using the online survey tool Qualtrics. The survey took 15 minutes to complete on average, although the number of questions participants answered varied because of the skip logic employed in the survey. Questions ranged from those asking about demographic characteristics of participants and their dogs, to particulars of their co-sleeping arrangements ("Where does the dog sleep?"), and the effect on respondents' sleep quality ("Overall, how would you rate your sleep quality?") and their frequency of waking up tired ("Do you wake up tired?"). We also included the following three scales:

Monash Dog Owner Relationship Scale (MDORS). This 28-item measure assesses the owner's perception of their relationship with their dog (Dwyer et al., 2006). The measure consists of three subscales: dog-owner interactions (e.g. 'How often do you groom your dog?'), perceived emotional closeness (e.g. 'My dog helps me get through tough times'), and perceived costs (e.g. 'It is annoying that I sometimes have to

change plans because of my dog'). Participants answer each question on a 5-point scale. Cronbach's alpha coefficients for the MDORS subscales range between 0.67 and 0.84 (Dwyer et al., 2006).

Mini-International Personality Item Pool (mini-IPIP). The mini-IPIP (Donnellan et al., 2006) is a 20-item measure that includes four items for each of the following factors: extraversion (i.e. 'Talk to a lot of different people at parties'), agreeableness (i.e. 'Feel others' emotions'), conscientiousness (i.e. 'Often forget to put things back in their proper place'), neuroticism (i.e. 'Get upset easily'), and intellect/imagination (i.e. 'Have a vivid imagination'). The mini-IPIP has been validated as an assessment of Big Five factors of personality. Cronbach's alpha coefficients for the mini-IPIP subscales range between 0.79 and 0.91 (Donnellan et al., 2006).

Monash Canine Personality Questionnaire-Revised (MCPQ-R). The MCPQ-R (Ley et al., 2009) asks participants to use a six-point scale to indicate how well each of 26 adjectives describes their dog, with 1 being 'really doesn't describe my dog', and 6 being 'really describes my dog.' This measure consists of five subscales: extraversion (e.g. 'active'), motivation (e.g. 'assertive'), training focus (e.g. 'attentive'), amicability (e.g. 'easy going'), and neuroticism (e.g. 'fearful').The subscales have good internal consistency, with Cronbach's alpha coefficients ranging between 0.74 and 0.87 (Ley et al., 2009).

The questions that comprised the MCPQ-R and the MDORS, as well as many other questions in the survey, asked participants about characteristics of an individual dog in their household and about how owners interacted with that individual. If participants indicated they had more than one dog, we asked them to base their answers to such questions on the dog they had owned the longest.

Ethical Approval

This study was approved by the Central Queensland University Human Ethics Committee (Reference: H14/10-212). As dogs did not actively participate in the study, Institutional Animal Care and Use Committee approval was neither required nor sought.

Data Analysis

All analyses were done using R version 3.6.0 (R Core Team, 2019). We used hierarchical multinomial logistic regression modeling and the R package *nnet* (Venables & Ripley, 2002) to test whether the following variables were associated with whether participants slept with dogs in their bed, in their bedroom but not in their bed, or not in their bedroom: participant age and gender; dog age, sex, and size; bed size; the number of dogs in the household; whether another human slept in the bed; MDORS subscales, mini-IPIP subscales, and MCPQ-R subscales. We standardized participant age, dog age, and MDORS, mini-IPIP, and MCPQ-R scores prior to analysis. We used the *anova* function to determine whether each model improved the fit over the preceding one, and we used the R package *caret* (Kuhn, 2008) to assess model accuracy. Because the best multinomial logistic regression model had an accuracy of 56% and only correctly predicted which individuals slept with their dog in their bedroom but not in their bed in 6% of cases, we ran a hierarchical binomial logistic regression using the *glm* function to identify what factors predicted whether participants shared their bed with their dog.

That is, we classified dogs as either sleeping on the bed or sleeping elsewhere, which included in the bedroom but not on the bed and outside the bedroom. We incorporated the same variables in the binomial logistic regression models as we had in the multinomial logistic regression models, and we used the *anova* function to compare models and *caret* (Kuhn, 2008) to assess model accuracy.

We used the *polr* function from the *MASS* package (Venables & Ripley, 2002) to conduct ordinal logistic regression modeling and identify factors that predicted participants' reports of their overall sleep quality and the frequency at which they tend to wake up tired. We used the *anova* function to determine whether each model improved the fit over the preceding one.

Results

Descriptive Statistics

Of 1712 individuals who started the survey, 1356 completed it, yielding a 79% completion rate. The findings reported here, however, are restricted to the 1136 participants who provided complete information regarding their age, their gender, where their dog slept, their dog's size, the size of their bed, the number of dogs in their household, the number of people in their bed, the MDORS, the MCPQ-R, and the mini-IPIP. Over half (53.9%) of participants had more than one dog in their household. For those participants, details about sleeping arrangements are specific to the dog they had owned the longest.

Participants ranged in age from 18 to 78 years old (M = 38.3, *SD* = 12.0), and 92% were female (*n* = 1040). Nearly half of participants reported sleeping with their dog in their bed (*n* = 555); 226 indicated their dog slept in their bedroom but not in their bed; and 355 reported their dog slept outside the bedroom. Of the dogs who slept on the bed, 27.7% slept under the covers and the rest slept on top of the covers. Just under half of dogs in the sample were between 11 kg and 30 kg (*n* = 539); 394 were under 11 kg; and 203 were over 30 kg. Only 21 participants slept in a single bed, whereas 893 slept in a double or queen size bed, and 222 slept in a king size bed. Most participants shared their bed with at least one other person (*n* = 733), but 403 indicated they were the only human in their bed. Scores on the MDORS, the mini-IPIP, and MCPQ-R subscales broken down by whether the dog slept in the bed, in the bedroom but not in the bed, or outside the bedroom are summarized in Table 1. The Cronbach's alphas are also included in Table 1 and ranged from 0.40-0.81 for the MDORS subscales, from 0.65-0.79 for the mini-IPIP subscales, and from 0.68-0.84 for the MCPQ-R subscales.

Few participants indicated their dog always (0.7%) or often (6.2%) disturbed their sleep throughout the night, and 27.5% reported their dog sometimes disturbed their sleep. More than half (51.9%) said their dog rarely disturbed their sleep, and 13.7% said their dog never disturbed their sleep. Of the 980 participants who indicated their dog did disturb their sleep at times, 42.2% said their dog woke them because they needed to toilet. Dogs also disturbed sleep by taking over the bed (20.5%), making noises while sleeping (18.0%), snoring (16.6%), stealing the bed covers (12.6%), needing a drink (10.4%), and wanting to play (5.6%). Just over half (54.1%) of dogs in the sample were able to toilet independently throughout the night.

Table 1. Cronbach's alpha for each MDORS, mini-IPIP, and MCPQ-R subscale, as well as a summary of the means and standard deviations for participants who slept with their dog in their bed, in their bedroom but not in the their bed, and outside their bedroom.

		Cronbach's alpha	**Bed (n = 555)**		**Bedroom but not bed (n = 226)**		**Outside bedroom (n = 355)**	
Dependent Variable			M	SD	M	SD	M	SD
MDORS								
	Dog-Owner Interaction	0.40	40.10	3.03	39.79	3.24	37.81	4.44
	Perceived Emotional Closeness	0.73	43.93	4.47	42.63	4.54	41.25	4.83
	Perceived Costs	0.81	38.46	4.84	37.82	4.70	37.46	5.03
Mini-IPIP								
	Extraversion	0.79	11.97	3.55	12.22	3.68	11.83	3.59
	Agreeableness	0.71	15.61	2.96	15.58	3.00	15.69	2.79
	Conscientiousness	0.69	13.82	3.28	14.09	3.11	14.09	3.24
	Neuroticism	0.71	11.60	3.27	11.28	3.41	11.66	3.19
	Imagination	0.65	14.16	2.95	14.72	2.80	14.32	3.07
MCPQ-R								
	Extraversion	0.84	70.43	15.32	67.32	16.70	70.95	17.05
	Motivation	0.68	67.00	14.76	63.47	14.70	64.35	15.07
	Training Focus	0.77	76.43	12.71	75.96	13.92	74.49	14.63
	Amicability	0.80	79.40	15.53	79.06	16.87	80.23	15.83
	Neuroticism	0.75	46.72	18.54	45.41	18.99	44.07	17.34

Where Dogs Sleep

Participants who indicated that their dog slept in the bedroom were presented with an image of a bedroom that represented the size of their bed and their number of human sleeping partners. We asked them to indicate on the image the location where their dog primarily sleeps by marking the location of the dog's chest. We used the Qualtrics survey software to create heat map images for three scenarios (Figure 1). The heat maps revealed that when two people co-slept with a dog(s) in a double, queen, or king size bed (scenario 1), the dog(s) tended to sleep at the participant's feet or in the middle of the bed, presumably where there is the most available space. When one person co-slept with a dog(s) in a double, queen, or king size bed (scenario 2), dogs mostly slept at human chest level on the bed, notably in a position identical to where a human partner would lay. For participants who co-slept with dog(s) on a single bed (scenario 3), dogs most commonly slept on the floor beside the bed, and when dog(s) did sleep on a single bed, they typically slept at human chest level (Figure 1).

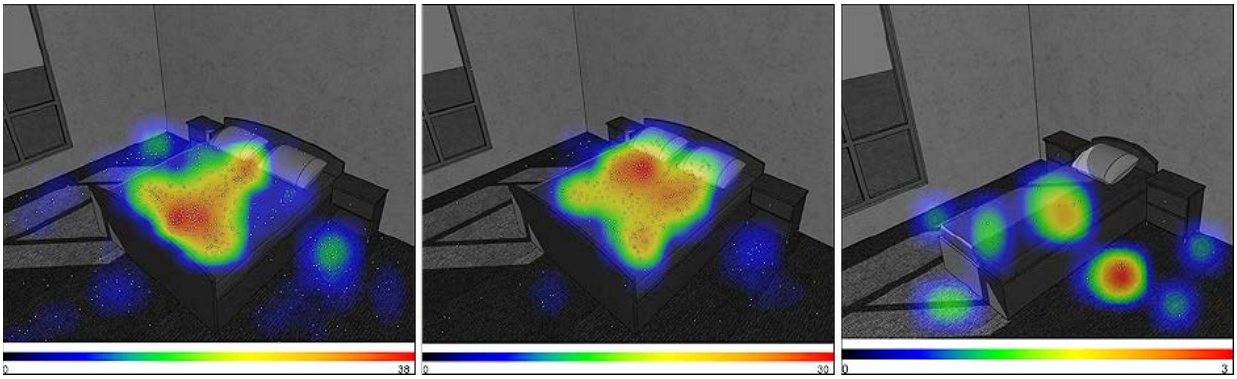

Figure 1. Location of the dog's sleeping position (chest) for participants who slept on a double, queen or king-size bed with one human sleeping partner, n = 517 (left); for participants who slept without a human partner on a double, queen or king size bed, n = 350 (middle); and for participants who slept without a human partner on a single bed, n = 16 (right). The colors represent the number of dogs reported sleeping in each location. Hot spots are indicated by red and represent the most common location of the dog.

Factors Predicting Where the Dog Sleeps

We used hierarchical binomial logistic regression modeling to identify what factors predicted whether participants shared their bed with their dog. Five hierarchical models are specified in Table 2. Model 2 included the covariates human age and dog age and the fixed factors human gender, dog sex, dog size, and number of dogs in the household, and it had a significantly better fit than the null model (Model 1; $\Delta X^2 = 95.4$, $\Delta df = 7$, $p < 0.001$). Findings indicated that the likelihood of sleeping in the bed increased with participant age ($B = 0.16$, $SE = 0.06$, $p < 0.05$), and that participants with medium and large dogs were less likely to share their bed with their dogs than those with small dogs (medium: $B = -1.13$, $SE = 0.14$, $p < 0.001$; large: $B = -1.24$, $SE = 0.18$, $p < 0.001$). In addition, participants with one dog in the household were less likely to share their bed with their dog than participants who had more than one dog ($B = -0.25$, $SE = 0.13$, $p < 0.05$).

Table 2. Hierarchical binomial logistic regression testing whether certain household characteristics, owner traits, dog traits, and characteristics of the dog-human relationship are predictive of whether the dog sleeps in the owner's bed.

	Model 1		Model 2		Model 3		Model 4		Final Model	
Fixed	β	SE	β	SE	β	SE	β	SE	β	SE
Intercept	-0.05	0.06	0.88***	0.14	-1.03	0.54	-4.47***	0.87	-4.30***	0.88
Human age	x	x	0.16*	0.06	0.08	0.07	0.14*	0.07	0.14	0.07
Dog age	x	x	-0.09	0.07	-0.15*	0.07	-0.13	0.07	-0.11	0.08
Gender: Male	x	x	-0.15	0.22	-0.13	0.23	-0.08	0.24	-0.12	0.24
Dog sex: Male	x	x	-0.06	0.13	-0.01	0.13	-0.02	0.13	0.01	0.14
Dog size										
Medium	x	x	-1.13***	0.14	-1.22***	0.15	-1.27***	0.15	-1.26***	0.15
Large	x	x	-1.24***	0.18	-1.30***	0.19	-1.33***	0.20	-1.28***	0.20
Number of dogs in house: One	x	x	-0.25*	0.13	-0.28*	0.13	-0.21	0.14	-0.18	0.14
Number of people in bed: One	x	x	x	x	1.24***	0.15	1.14***	0.15	1.14***	0.15
Bed size										
Medium	x	x	x	x	1.47***	0.52	1.36*	0.54	1.30*	0.54
Large	x	x	x	x	1.81***	0.54	1.69**	0.56	1.66**	0.56
MDORS										
Dog-Owner Interaction	x	x	x	x	x	x	0.31***	0.08	0.33***	0.08
Emotional Closeness	x	x	x	x	x	x	0.08***	0.02	0.08***	0.02
Perceived Costs	x	x	x	x	x	x	-0.02	0.07	0.02	0.07
MCPQ										
Extraversion	x	x	x	x	x	x	x	x	0.04	0.09
Motivation	x	x	x	x	x	x	x	x	0.19*	0.08
Training focus	x	x	x	x	x	x	x	x	-0.02	0.08
Amicability	x	x	x	x	x	x	x	x	-0.04	0.08
Neuroticism	x	x	x	x	x	x	x	x	0.10	0.07
Model Fit										
AIC	1576.2		1494.8		1420.8		1360.0		1359.3	
Comparision Model			1		2		3		4	
$\Delta\chi^2$			95.4***		80.0***		66.8***		10.8	
Δdf			7		3		3		5	
*p < .05, **p < .01, ***p < .001										

Model 3 included the addition of bed size and whether there was more than one human in the bed, and it had a significantly better fit than Model 2 ($\Delta X^2 = 80.0$, $\Delta df = 3$, $p < 0.001$). Participants were more likely to share their bed with their dog if there were no other humans in the bed ($B = 1.24$, $SE = 0.15$, $p < 0.001$). Compared to participants who slept in a small (single) bed, those who slept in a medium (double or queen) or large (king) bed were more likely to sleep with their dogs (medium: $B = 1.47$, $SE = 0.52$, $p < 0.001$; large: $B = 1.81$, $SE = 0.54$, $p < 0.001$).

Model 4 included the addition of the three MDORS subscales and had a significantly better fit than Model 3 ($\Delta X^2 = 66.8$, $\Delta df = 3$, $p < 0.001$). Participants with greater dog-owner interaction and emotional closeness scores were more likely to sleep with their dogs (dog-owner interaction: $B = 0.31$, $SE = 0.08$, $p < 0.001$; emotional closeness: $B = 0.08$, $SE = 0.02$, $p < 0.001$). When the five mini-IPIP subscales were added to the model, the AIC increased and the model fit did not improve ($\Delta X^2 = 5.39$, $\Delta df = 5$, $p = 0.37$), so the mini-IPIP subscales were not retained in the final model. The final model included the addition of the five MCPQ-R subscales. Although this model did not significantly improve the model fit when compared against Model 4 ($\Delta X^2 = 10.8$, $\Delta df = 5$, $p = 0.06$), we have included the results of it here because the AIC was slightly lower in Model 5. Owners who rated their dogs more highly on the MCPQ-R Motivation subscale were more likely to sleep with their dogs ($B = 0.19$, $SE = 0.08$, $p < 0.05$). This final model predicted whether the dog slept in the bed with an accuracy of 66%

Based on the final model, the odds of sleeping with one's dog increased by 1.15 for each one year increase in human age. Participants with small dogs were 3.53 times

more likely to sleep with their dog than participants with medium-sized dogs and 3.59 times more likely than participants with large dogs. Those who did not have another human in the bed were 3.13 times more likely to share their bed with their dog than those who did. Compared to participants who had a small bed, those with a medium-sized bed were 3.68 times more likely to share their bed with their dog, and those with a large bed were 5.25 times more likely. For each unit increase on the MDORS Dog-Owner Interaction scale, the odds of sleeping with the dog increased by 1.39, and for each unit increase on the MDORS Emotional Closeness scale, the odds increased by 1.08. Finally, for each unit increase on the MCPQ-R Motivation scale, the odds of sleeping with the dog increased by 1.21.

Factors Predicting Self-Reported Sleep Quality and Frequency of Waking Tired

The hierarchical ordinal logistic regression models that we ran to identify factors that predicted participants' reports of their overall sleep quality are specified in Table 3. Model 2 included the covariate human age and the fixed factors human gender, bed size, number of dogs in the household, and whether there was more than one human in the bed, and it had a significantly better fit than the null model (Model 1; $\Delta X^2 = 32.2$, $\Delta df = 6$, $p < 0.001$). Participant age was negatively associated with sleep quality ($B = -0.33$, $SE = 0.06$, $p < 0.001$). Model 3 included the addition of whether the dog slept on the bed and did not improve the model fit ($\Delta X^2 = 0.01$, $\Delta df = 1$, $p = 0.91$); thus, there was no association between whether the dog slept on the bed and self-reported sleep quality. Based on the final model, for each one year increase in human age, the odds of good sleep quality decreased by 1.39.

Table 3. Hierarchical ordinal logistic regression testing whether certain household characteristics, owner traits, dog traits, and whether the dog sleeps in the bed are predictive of owner-reported sleep quality.

		Model 1			**Model 2**			**Model 3**	
Fixed		β	SE		β	SE		β	SE
Intercepts									
	Poor|Average	-2.29***	0.10		-2.09***	0.50		-2.09***	0.50
	Average|Good	-0.56***	0.06		-0.32	0.49		-0.32	0.49
Age		x	x		-0.33***	0.06		-0.33***	0.06
Gender: Male		x	x		0.23	0.23		0.23	0.23
Number of dogs in house: One		x	x		0.12	0.12		0.12	0.12
Number of people in bed: One		x	x		0.07	0.14		0.08	0.14
Bed size									
	Medium	x	x		0.18	0.48		0.19	0.48
	Large	x	x		0.05	0.50		0.06	0.51
Where dog sleeps: On bed		x	x		x	x		-0.01	0.13
Model Fit									
AIC		1959.3			1939.1			1941.1	
Comparision Model					1			2	
$\Delta\chi^2$					32.2***			0.01	
Δdf					6			1	
*p < .05, **p < .01, ***p < .001									

Table 4 includes the hierarchical ordinal logistic regression models that we ran to identify factors that predicted the frequency of waking up tired. Model 2, which included the covariate human age and the fixed factors human gender, bed size, number of dogs in the household, and whether there was more than one human in the bed, had a better fit than the null model (Model 1; $\Delta X^2 = 17.0$, $\Delta df = 6$, $p < 0.01$). There was a negative association between age and the frequency of waking up tired ($B = -0.17$, $SE = 0.06$, $p < 0.01$), and males were less likely to wake up tired than females ($B = -0.56$, $SE = 0.23$, $p < 0.05$). Model 3 included the addition of whether the dog slept on the bed and significantly improved the model fit ($\Delta X^2 = 8.9$, $\Delta df = 1$, $p < 0.01$). Participants whose dogs slept in the bed with them reported lower frequency of waking tired than those who did not ($B = -0.37$, $SE = 0.12$, $p < 0.01$). Based on the final model, the likelihood of frequently waking up tired decreased by 1.18 for each one year increase in age. Males were 1.77 times less likely to report frequently waking up tired than females, and participants whose dogs did not sleep on the bed were 1.45 times more likely to report frequently waking up tired.

Table 4. Hierarchical ordinal logistic regression testing whether certain household characteristics, owner traits, dog traits, and whether the dog sleeps in the bed are predictive of how frequently owners report waking up tired.

		Model 1			**Model 2**			**Model 3**	
Fixed		β	SE		β	SE		β	SE
Intercepts									
	Never|Sometimes	-2.96***	0.14		-3.39***	0.46		-3.44***	0.46
	Sometimes|Often	0.67***	0.06		0.28	0.44		0.26	0.44
	Often|Always	2.28***	0.10		1.90***	0.45		1.89***	0.45
Age		x	x		-0.17**	0.06		-0.17**	0.06
Gender: Male		x	x		-0.56*	0.23		-0.57*	0.23
Number of dogs in house: One		x	x		-0.10	0.12		-0.12	0.12
Number of people in bed: One		x	x		-0.13	0.13		-0.03	0.14
Bed size		x	x						
	Medium	x	x		-0.25	0.43		-0.13	0.43
	Large	x	x		-0.37	0.46		-0.23	0.46
Where dog sleeps: On bed		x	x		x	x		-0.37**	0.12
Model Fit									
AIC		2308.6			2303.6			2296.7	
Comparision Model					1			2	
$\Delta\chi^2$					17.0**			8.9**	
Δdf					6			1	
*p < .05, **p < .01, ***p < .001									

Discussion

Nearly 70% of participants indicated they co-slept with their dog. Most of those individuals allowed their dog to sleep in their bed, and the rest indicated their dog slept in their bedroom but not in their bed. A number of factors were associated with whether participants shared their bed with their dog. Older participants were more likely to bedshare with their dogs, as were individuals who had small dogs rather than medium- or large-sized dogs. Bed size also impacted the likelihood of bedsharing, with participants in small beds being less likely to bedshare than participants in larger beds. In addition, individuals were more likely to bedshare if their bed did not include other humans. MDORS scores on the Dog-Owner Interaction and Emotional Closeness scales were positively associated with bedsharing. Dogs whose owners rated them highly on the Motivation subscale of the MCPQ-R were more likely to bedshare as well. Interestingly, no human personality characteristics were associated with one's tendency to bedshare.

Prior studies have reported that the amount of time dog and owner spend together is positively associated with owner-perceived closeness with the dog (Dotson & Hyatt, 2008; Dwyer et al., 2006), and our findings, based on owners' reports of their emotional closeness with their dog, suggest that this association may extend to the time that dog and owner spend sleeping together. In addition, according to a study of older Australian adults, the amount of time dog and owner are together is positively associated with the owner's psychological well-being (Bennett et al., 2015); however, it is unknown whether the time dog and human spend together during sleep periods has an effect on human psychological well-being.

Individuals may allow their dogs to sleep on their bed for a variety of reasons. Dogs who score highly on the MCPQ-R Motivation scale are characterized as being assertive, determined, independent, persevering, and tenacious (Ley et al., 2009). In the context of sleep, one might envision such dogs barking or whining, or even engaging in destructive behaviors, if excluded from the bed. In addition, owners may find that highly tenacious dogs are already on the bed before they themselves have a chance to crawl under the sheets. With such persistent dogs, it is not surprising that owners may bedshare with their dogs even if bedsharing was not part of their initial plan. Based on parent-child co-sleeping research, dog owners may not be very enthusiastic about their bedsharing arrangements if their main motivation for sleeping with their dog is to ward off disruptive behaviors the dog would engage in otherwise. Parents who begin co-sleeping with their children in response to their children's nighttime sleep problems tend to be less satisfied with their co-sleeping arrangements than parents who intentionally begin co-sleeping when their infants are young (Germo et al., 2007).

Self-reported sleep quality did not differ between individuals who did and did not share their bed with their dogs. Individuals are not necessarily the best judges of their own sleep quality, however, as humans rarely recall instances when dogs disturb their sleep (Hoffman et al., 2020). Notably, participants whose dogs did not share their bed with them reported waking up tired more frequently, suggesting that those who bedshare with their dog may have more restful nights. This may be due to participants being better able to relax when their dog is in their bed, as individuals who share their bed with their dog commonly report the dog provides a sense of comfort and security (Brown et al., 2018; Hoffman et al., 2018; Krahn et al., 2015; Smith et al., 2014). In

addition, dogs may be more inclined to be active at night and bark if they are not in their owner's bed (Thompson & Smith, 2014). That is, bedsharing with a human may affect dogs' nighttime sleep patterns. A laboratory-based study concluded that the major sleep period for dogs is between 2100hr and 0400hr (Lucas et al., 1977), and dogs are known to wake often during the night (Adams & Johnson, 1994); however, dogs kept indoors tend to synchronize their sleep patterns with their humans (Randler et al., 2018). We hypothesize that dog and human sleep periods are most closely synchronized when the two share the same bed and so are maximally exposed to each other's nighttime behaviors.

Future Directions

While this study has identified human, dog, and lifestyle factors that predict whether dog and owner share a bed, other important factors may affect bedsharing as well. For instance, owners' reasons for having a dog and their thoughts about the dog's role in the household are likely to impact bedsharing decisions. Some individuals treat their dogs as surrogate children, which can both elevate the pet's status in the home and lead owners to overlook dogs' species-specific needs (Blouin, 2013). Others, according to Blouin, have a dominionistic orientation and hold that dogs serve a function but are less than human and should not be provided with "people" things, such as a place in human beds. Furthermore, some dog owners take an authoritarian, correction-focused approach to life with their dogs, while others take a more authoritative approach that focuses on dogs' needs and on teaching them proper social behavior (Bouma et al., 2018). No doubt these philosophies impact the nature of the human-dog relationship and the physical and emotional distance individuals place between themselves and their dogs. Thus, future research into bedsharing might build off work by Blouin (2013) and Bouma et al. (2018) and include questions about owners' reasons for having a dog and the type of relationship they desire to have with their dog.

Based on our findings and those of previous studies (Hoffman et al., 2018, 2020; Smith et al., 2018), individuals who share their bed with their dog do not readily report that their dog interferes with their sleep quality; however, actigraphy-based studies indicate that individuals who bedshare with their dog do experience slightly poorer sleep efficiency (Patel et al., 2017; Smith et al., 2018). Thus, further research is needed to determine whether the poorer sleep efficiency that has been observed in those who bedshare is driven by the dog or by characteristics of the individuals who choose to bedshare. Such a study could employ actigraphy and a within-subjects design to compare individuals' sleep on nights when they do and do not bedshare with their dog. By incorporating psychological measures, this study could also assess whether the amount of time dog and owner spend sleeping in the same bed is associated with greater psychological well-being.

Although we found that people are less likely to bedshare with their dog if another human is in the bed, sharing one's bed or bedroom with a dog is still a common practice and may impact interpersonal relationships (Thompson & Smith, 2014). When parents co-sleep with a young child, the child unwittingly competes with one or both sexual partners for attention and affection (Stein et al., 2001), and a dog may do the same. Thus, it is important to identify whether the costs and benefits of sharing one's bed or bedroom with a dog differ for individuals depending upon whether they bedshare

with a human partner. In addition, future studies could investigate how couples decide whether to allow a dog into their bed or bedroom and how this decision impacts the interhuman relationship. Human-animal co-sleeping arrangements with cats are also worth pursuing, particularly since cats tend to be more active during the night than dogs (Campbell & Tobler, 1984).

Conclusions

This study presents one of the few comprehensive investigations into the practice of human-dog co-sleeping. Results from our Australian sample support previous claims that dog owners commonly choose to sleep with their dog in their bed or bedroom, and highlight the status and role that dogs hold in human society. Our findings also provide further evidence that human-animal co-sleeping represents a legitimate form of co-sleeping that should be considered alongside human-human co-sleeping (Smith et al., 2017). Although the nature of human-dog co-sleeping relationships is extremely varied, individuals who were most likely to allow their dog into their bed were older, were single, slept on larger beds, and had small dogs. We also found that some elements of the dog's personality and the nature of the human-dog relationship predicted likelihood of bedsharing. Findings from this study and other recent human-dog co-sleeping studies suggest that bedsharing with dogs is unlikely to impact sleep quality negatively in any meaningful way. In fact, owners may derive psychological benefits from allowing their dogs to sleep with them, and dogs in the bed may facilitate a more restful night's sleep than dogs who sleep elsewhere.

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