The curious incident of the dog in the nighttime: The effects of pet-human co-sleeping and bedsharing on sleep dimensions of children and adolescents

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ABSTRACT

Background: Pets are often thought to be detrimental to sleep. Up to 75% of households with children have a pet, and 30-50% of adults and children regularly share their bed with their pets. Despite these high rates, few studies have examined the effect of pet-human co-sleeping on pediatric sleep. This study compared subjective and objective sleep in youth who never, sometimes, or frequently co-slept with pets.

Methods: Children (N = 188; aged 11-17 years; M = 13.25 years) and their parents answered standardized sleep questionnaires assessing timing, duration, onset latency, awakenings, and sleep quality. Children completed a home polysomnography (PSG) sleep study for one night and wore an actigraph for two weeks accompanied with daily sleep diary. Based on reported frequency of bedsharing with pets, children were stratified into three co-sleeping groups: never (65.4%), sometimes (16.5%), frequently (18.1%).

Results: Overall, 34.6% of children reported co-sleeping with their pet sometimes or frequently. Results revealed largely identical sleep profiles across co-sleeping groups; findings were congruent across sleep measurement (subjective: child, parent report; objective: PSG, actigraphy). Effect sizes indicated that frequent co-sleepers had the highest overall subjective sleep quality, but longest PSG onset-latency compared to the sometimes group.

Conclusions: Co-sleeping with pets was prevalent in one third of children. Sleep dimensions were similar regardless of how frequently children reported sharing their bed with their pet. Future research should examine dyadic measurement of co-sleepers to derive causal evidence to better inform sleep recommendations.

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Further, many individuals with allergies or respiratory problems (eg, asthma) still choose to sleep with their pets.5 Few studies have examined pet-human co-sleeping using objective methods to quantify sleep. Patel and colleagues11 used actigraphy to simultaneously assess sleep in 40 dog-human dyads; higher sleep efficiency and shorter wake after sleep onset (WASO) were observed among dog owners whose dogs slept in the bedroom (but not on the bed) than those who shared a bed with their dogs. People who did not sleep with a dog in their bed or bedroom were not included, precluding comparison with these groups. Smith, Browne, Mack, and Kontou12 reported similar findings in five dog-human dyads using actigraphy. Dogs’ movements predicted human movement, and humans were significantly more likely to be awake during their dogs’ periods of wakefulness than their dogs’ periods of inactivity. Curiously, despite these apparent sleep disruptions, dog owners reported good sleep quality. Hoffman et al.13 similarly found that dogs’ movements predicted and frequently accompanied human movement, but individuals rarely reported awakenings or poor sleep quality. This discrepancy between activity-based sleep disruptions (measured using actigraphy) vs. subjective sleep reports parallels that observed in human-human co-sleeping. For example, among couples, sharing a bed with a partner is associated with poorer sleep measured using actigraphy, but with greater sleep satisfaction.14,15 One plausible explanation for this discrepancy revolves around measurement. It is possible that actigraphy may inadvertently detect the bed partners’ activity, giving a false impression of one’s poor sleep when sharing a bed. Importantly, prior findings raise the question whether methodological limitations attributable to (mis)measurement during co-sleeping may bias “objective” quantification of sleep using actigraphy data.

To date, most pet-human co-sleeping research has been conducted with adults; yet, pet companionship is prevalent across the lifespan. Similar to adults, children report strong attachment to their pets and view them as a source of social support, affection, and comfort.3,16 Pet ownership is particularly common among families with children, with up to 75% of school-aged children living in a household with a pet.17 Scant data exist on the prevalence and impact of co-sleeping with pets during childhood. To the best of our knowledge, only one study has examined these relations. Hoedlmoser, Kloeisch, Wiater, and Schabus found that nearly 30% of children aged 8 to 11 years old shared a bed or a bedroom with their pet, and these children were more likely to report nighttime awakenings.18 It remains unclear whether co-sleeping influences other sleep dimensions in children, such as duration, onset latency, or midpoint. There is also a notable absence of research using objectively quantified assessment of sleep, such as actigraphy or polysomnography to examine pet-child co-sleeping. Sleep is critical for children’s emotional, behavioral, and academic functioning.19,20 Sleep needs and habits change across development (eg, delayed sleep onset in adolescents) underscoring the importance of understanding factors that influence sleep during childhood and adolescence.

The present study aims to examine the sleep of children and adolescents who report co-sleeping with their pet compared to those who never do. Previous studies in adults have yielded mixed results, suggesting that co-sleeping with pets may have differing effects on subjectively and objectively measured sleep. This study investigated the effects of bedsharing with pets on children’s sleep using self- and parent-report measures, actigraphy, and polysomnography.

Methods

Study sample

Children and adolescents (N = 188) participated in the larger Healthy Heart Project at Concordia University. Children and their parents were recruited using flyers posted in the community and bookmarks distributed at schools approved by the local school board. Exclusion criteria included severe psychopathology that would limit participation (eg, psychosis, severe intellectual disability) or medication use known to interfere with cardiovascular or endocrine functioning. The present study was limited to children aged 11 to 17 who answered a single question about bed sharing (see below). Parents provided informed consent and children gave assent prior to beginning the study. Families were compensated for their time. The study followed the ethical standards of the Helsinki Declaration and was approved by the Concordia University Research Ethics Board (# UH10000088).

Procedure

Children and their parents completed two laboratory visits scheduled up to two weeks apart. At the first visit, they answered questionnaires about demographics (eg, sex, age, parental education, household income), household routine, presence of allergies and/or asthma, and sleep behaviors. Children were fitted with wearable devices to measure sleep, including wrist actigraphy and ambulatory polysomnography (PSG). Between visits, children completed a daily sleep diary. At the second visit, participants returned the devices and sleep diary.

Sleep questionnaires

Parents and children completed standardized questionnaires. Parents completed the Children’s Sleep Habits Questionnaire (CSHQ),21 which includes items about their child’s sleep timing, habits, and disturbances. Although the CSHQ was originally designed for children aged 4 to 10 years, its use has been extended to adolescents.22-24 The CSHQ has shown high internal consistency, test-retest reliability, and construct validity.21 Children completed the Consensus Sleep Diary25 with wording adapted for children. Previous research has demonstrated moderate to good correspondence between sleep diary and actigraphy for timing (bedtime, waketime) in children and adolescents.26-28

Actigraphy

Children wore a wrist actigraph (Philips Respironics Actiwatch 2) on their non-dominant wrist continuously for up to two weeks (M = 11.9 nights, SD = 2.7); devices were removed only for submerged water activities (eg, swimming, bathing). Actigraphy data were manually inspected and scored using a standardized, validated protocol29 to identify the lights off / lights on (ie, rest) interval. Nightly data were then analyzed using Actiware software (Version 6) and averaged across the 14-night period. Data missingness was minimal (5.4% nights missing).

Ambulatory polysomnography (PSG)

Children completed a home sleep study for one night with ambulatory PSG (Grass TREA). Prior to bedtime, parents placed EEG electrodes (Ambu Blue Sensor) directly onto the child’s forehead (FP1, FP2, active electrodes), left and right mastoids (A1, A2, referent electrodes), left clavicle (ground electrode); two EOG electrodes on the left and right temple; an EMG electrode on the chin; and three ECG electrodes (ClearTrace 2) in a Lead II configuration. A registered polysomnographic technologist independently scored PSG data using Rechtschaffen and Kales30 criteria and guidelines of the American Academy of Sleep Medicine.31 Data missingness was modest (3.8% hardware syncing error, 11.6% poor signal quality).
Sleep dimensions

Subjective and objective measures were used to derive sleep dimensions: timing (bedtime, waketime, midpoint), duration, onset latency, awakenings (wake bouts, wake after sleep onset), and sleep quality. A matrix of the sleep dimensions by the sleep measures is depicted in Fig. 1.

<table>
<thead>
<tr>
<th>Timing (Hours)</th>
<th>Child-Report</th>
<th>Parent-Report</th>
<th>Actigraphy</th>
<th>PSG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedtime</td>
<td>Sleep Diary: “What time did you close your eyes and try to go to sleep last night?”</td>
<td>Bedtime: CSHQ: “What time does your child usually go to bed?”</td>
<td>Bedtime: Onset of rest interval (lights out)</td>
<td>Bedtime: Lights out as defined by AASM criteria (event marker scoring)</td>
</tr>
<tr>
<td>Waketime</td>
<td>Sleep Diary: “What time did you wake up this morning?”</td>
<td>Waketime: CSHQ: “What time does your child usually wake up?”</td>
<td>Waketime: Offset of rest interval (lights on)</td>
<td>Waketime: Lights on as defined by AASM criteria (event marker scoring)</td>
</tr>
<tr>
<td>Midpoint</td>
<td>Median time between bedtime &amp; waketime</td>
<td>Midpoint: Median time between bedtime &amp; waketime</td>
<td>Midpoint: Median time between bedtime &amp; waketime</td>
<td>Midpoint: Median time between bedtime &amp; waketime</td>
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<thead>
<tr>
<th>Duration (Minutes)</th>
<th>Child-Report</th>
<th>Parent-Report</th>
<th>Actigraphy</th>
<th>PSG</th>
</tr>
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<tbody>
<tr>
<td>Sleep Diary: Duration (bedtime minus waketime)</td>
<td>CSHQ: Duration (bedtime minus waketime)</td>
<td>Number of minutes between onset of sleep interval &amp; final awakening</td>
<td>Number of minutes between first 30-s epoch scored as sleep (sleep onset) &amp; final awakening</td>
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<tr>
<td>Sleep Diary: “How long did it take you to fall asleep last night?”</td>
<td>CSHQ: “Child falls asleep within 20 minutes after going to bed?” (Rarely, Sometimes, Usually) *Percent (%Rarely)</td>
<td>Number of minutes between onset of rest interval (lights-out) and onset of sleep interval</td>
<td>Number of minutes between lights-out and first 30-s epoch score as sleep (sleep onset)</td>
<td></td>
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<thead>
<tr>
<th>Awakenings (Frequency Count/Minutes)</th>
<th>Child-Report</th>
<th>Parent-Report</th>
<th>Actigraphy</th>
<th>PSG</th>
</tr>
</thead>
<tbody>
<tr>
<td>WASO Sleep Diary: “In total, how long did these awakenings last?”</td>
<td>WASO: CSHQ: “How many minutes is your child awake during the entire night?”</td>
<td>Wake bouts: Total number of discrete awakenings (discrete epochs scored as wake, separated by ≥1 epoch scored as sleep), within the sleep interval</td>
<td>Wake bouts: Total duration of wake bouts in minutes, within the sleep interval</td>
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<tbody>
<tr>
<td>Sleep Diary: “How would you rate the quality of your sleep last night?” (Very poor, Poor, Fair, Good, Very good, 0 to 4)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 1. Sleep measurement by sleep dimension matrix. CSHQ, Children’s Sleep Habits Questionnaire. WASO, wake after sleep onset. PSQI, Pittsburgh Sleep Quality Index. AASM, American Academy of Sleep Medicine.

Timing

Children’s sleep patterns were evaluated using self-reported bedtimes and waketimes recorded in the sleep diary. Parents answered questions about their child’s usual sleep timing (eg, “What time does your child usually go to bed on weekdays?”). Bedtime and waketimes (lights off/on) were also derived from actigraphy and PSG data. Sleep midpoint was calculated as the midpoint between bedtime and waketime; it was derived using the corresponding times from child-report, parent-report, actigraphy, and PSG. Sleep midpoint is associated with circadian timing and dim light melatonin onset.32

Duration

Child-reported sleep duration was calculated using bed/wake times recorded in the sleep diary. Parent-reported sleep duration was calculated using bed/wake times reported on the CSHQ.21 Actigraphy and PSG each yielded the total number of minutes between sleep onset and final awakening.

Onset latency

Children recorded the time spent trying to fall asleep (in minutes) each morning in the sleep diary. Parent-reported onset latency was derived from the CSHQ (eg, “Child falls asleep within 20 minutes after going to bed?”); response options were categorical (Fig. 1). Actigraphy and PSG each yielded the total number of minutes between sleep onset and final awakening.
and PSG scoring protocols define onset latency as the number of minutes between lights-out and the first 30-second epoch scored as sleep.

Awakenings
Children recorded the number of awakenings and estimated the time spent awake during the previous night in the sleep diary. Parents answered questions about their child’s typical number of awakenings (eg, “Child awakes once during the night?”; categorical response options) and WASO (eg, “How many minutes is your child awake during the night?”) on the CSHQ.21 Ratings of sleep quality are commonly used to evaluate subjective perceptions of feeling rested and satisfied with one’s sleep75 and have been previously used in children and adolescents.35,36

Co-sleeping and bedsharing with pet
Children answered one question assessing co-sleeping (“How often do you share your bed with your pet?”) in the past month using a 6-point Likert scale (0 = very poor, 4 = very good). Type of pet was not specified. Children who skipped this question (n = 4; ie, there was no response option for “does not apply”) were excluded from the present sample. Children were stratified into three groups based on frequency of co-sleeping: those who never co-slept with pets (never), those who sometimes co-slept with pets (sometimes, once in a while), and those who frequently co-slept with pets (quite often, frequently, always). Sensitivity analyses were tested with those excluded and retaining the co-sleeping variable as ordinal; all results were robust and are not presented for parsimony. Household pet status was not assessed; the never co-sleeping group included children who never slept with their pet and children in non-pet households.

Statistical analysis
Data were analyzed using SPSS version 24.0. Variables were inspected for normality and outliers. Scatterplots, frequency histograms, and descriptive statistics (means, standard deviations, minimum, maximum, skewness, kurtosis) were examined for all variables. Data missingness did not differ by co-sleeping group. Extreme outliers were excluded from analyses. Sociodemographic characteristics (eg, sex, age, parental education, household income) and possible confounding variables (eg, asthma, allergies, sleeping arrangements) were compared across the three groups using chi-square analyses (categorical variables) and one-way analysis of variance (ANOVA; continuous variables). To test whether sleep dimensions differed across the three groups, one-way analysis of variance (ANOVA) (or chi-square for two categorical parent-reported variables: latency, wake bouts), Hedges’ g effect sizes, and 95% confidence intervals (CIs) were calculated for each comparison. Violin plots were created using R (library package ggplot2).

Results
Children (N = 188) were predominantly male (55.9%) and Caucasian (63.5%; Asian 5.3%; Black 5.3%; Latin American 3.3%; Aboriginal 1.6%; Other/Mixed 20.9%). The mean age of the sample was 13.25 years (SD = 1.79). Most parents had completed a university degree (M = 16.12 years of education, SD = 2.91), and families had an average household income of $1016.63 (CAD; SD= $611K). Overall, 34.6% of our sample reported co-sleeping with a pet; 18.1% frequently, 16.5% sometimes, 65.4% never. No significant differences were found across the co-sleeping groups for sociodemographics (sex, age, parental education, household income), presence of allergies and asthma, or sleeping arrangements (eg, sharing a bedroom with others). Sample characteristics are presented in Table 1.

Sleep dimensions were found to be comparable across all three co-sleeping groups, irrespective of measurement modality (ie, subjective: child- and parent-report; objective: actigraphy and PSG). All one-way ANOVAs (and 2 chi-squares) revealed no significant differences (ps > 0.10) across the co-sleeping groups (omnibus testing) for any sleep dimension (Table 2). In other words, children displayed similar timing (bed/wake times, midpoint), duration, and onset latency regardless of pet co-sleeping frequency. Children who sometimes or frequently co-slept with pets experienced no more wake bouts than those who never co-slept with pets, and spent no more time awake during the night. Further, comparable ratings of sleep quality were found across all three groups.

Although equivalence across groups cannot be established, Hedges’ g effect sizes and confidence intervals for each comparison were examined to further evaluate comparability of the co-sleeping groups (Table 2). The effect size confidence intervals for all dimensions across all measurements included zero, providing additional support for the absence of observed group differences. Two moderate effect sizes were observed (Hedges’ g > 0.4); albeit, the 95% CIs included zero. Frequent co-sleepers had longer onset latency (M = 26.06, SD = 18.00) compared to sometimes co-sleepers for PSG

Table 1 Demographic characteristics of pet co-sleeping groups

<table>
<thead>
<tr>
<th></th>
<th>Frequently (n = 34)</th>
<th>Sometimes (n = 31)</th>
<th>Never (n = 123)</th>
<th>Total (N = 188)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (% male)</td>
<td>15 (44.1%)</td>
<td>15 (48.4%)</td>
<td>75 (61.0%)</td>
<td>105 (55.9%)</td>
</tr>
<tr>
<td>Sleep alone (% yes)</td>
<td>22 (64.7%)</td>
<td>22 (71.0%)</td>
<td>96 (78.0%)</td>
<td>140 (74.5%)</td>
</tr>
<tr>
<td>Sleep with someone (% yes)</td>
<td>12 (35.3%)</td>
<td>10 (32.3%)</td>
<td>32 (26.0%)</td>
<td>54 (28.1%)</td>
</tr>
<tr>
<td>Allergies (% yes)</td>
<td>7 (20.6%)</td>
<td>9 (30.0%)</td>
<td>41 (34.7%)</td>
<td>57 (31.7%)</td>
</tr>
<tr>
<td>Asthma (% yes)</td>
<td>4 (14.3%)</td>
<td>4 (13.3%)</td>
<td>20 (16.9%)</td>
<td>28 (15.4%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>13.06 (1.74)</td>
<td>13.36 (1.82)</td>
<td>13.27 (1.73)</td>
<td>13.25 (1.74)</td>
</tr>
<tr>
<td>Parental education (years)</td>
<td>15.45 (2.89)</td>
<td>16.42 (3.03)</td>
<td>16.22 (2.91)</td>
<td>16.12 (2.91)</td>
</tr>
<tr>
<td>Household income ($K CAN)</td>
<td>103.41 (61.90)</td>
<td>98.18 (69.57)</td>
<td>102.00 (59.58)</td>
<td>101.59 (61.28)</td>
</tr>
</tbody>
</table>

Note. No significant differences were observed between groups across any variables.
only \( M = 19.06, SD = 14.81 \); Hedges’ \( g = -0.42, 95\% CI = -0.98, 0.14 \). Frequent co-sleepers also had higher subjective sleep quality \( (M = 7.56, SD = 1.62) \) compared to sometimes co-sleepers for the overall rating only \( (M = 6.81, SD = 2.01) \); Hedges’ \( g = -0.41, 95\% CI = -0.91, 0.08 \). Finally, violin plots depicting the shape of the distribution of sleep dimensions across the co-sleeping groups were also largely similar and provided further evidence of their comparability (Fig. 2).

**Discussion**

Co-sleeping with pets is highly prevalent, but little is known about its effect on children’s sleep. Pets are colloquially considered to be disruptive to sleep, but few studies support this claim. Many pet owners perceive their pets to be calming and beneficial to their sleep. The present study compared sleep dimensions across children who reported never to frequently co-sleeping with pets. Overall, reported co-sleeping with pets was not found to disrupt sleep. In fact, frequent co-sleepers showed similar sleep profiles to those who never slept with pets. While sleep results were robust across the co-sleeping groups, it is necessary to reiterate that co-sleeping was quantified using a single self-report question; causal evidence about the effect of co-sleeping behavior cannot be derived in the absence of dyadic sleep data (i.e., pet proximity, duration on bed). Notably, all groups were comparable across a comprehensive array of sleep dimensions, regardless of subjective or objective assessment modality. Although equivalence could not be formally tested, the sleep dimensions were strikingly similar across co-sleeping groups. There were no statistically significant differences between co-sleeping groups, and all effect size coefficients further indicated there were no significant differences across the groups. While the inclusion of zero within a confidence interval does not necessarily signify a lack of meaningful difference, \( g < 0.10 \) may be interpreted as additional evidence of comparability across groups.
given the lack of statistical significance, high similarity across sleep variables, and generally small effect sizes. Moderate effect sizes (>.4) were noted for overall subjective sleep quality and PSG-derived latency. For these two noted exceptions, frequent co-sleepers showed longer PSG onset latency and reported greater overall sleep quality than the sometimes co-sleepers. Altogether, these preliminary results suggest that bedsharing with pets may not adversely affect sleep of children and adolescents.

Past research using actigraphy-derived sleep has demonstrated increased movement and nighttime awakenings among adults who share their bed with their pets\textsuperscript{11,12}; this was not observed in the present sample with children. This may be due to methodological differences, as past studies restricted participation to dog owners, recorded data for fewer nights, did not include a control group (ie, non-co-sleepers), assessed co-sleeping using a nightly log (ie, could not ascertain presence or absence of pet on given night), and did not include PSG. Alternatively, co-sleeping with a pet may be less disruptive to children than adults. This possibility could be due to physical characteristics of the person and the sleep environment; adults are generally larger and occupy more space than children, and many adults share a bed with a partner in addition to their pets. The presence of a pet may be less intrusive to children who are smaller and have more space available in their beds. Others have suggested that pets play a unique role in children’s social networks, and co-sleeping with pets likely has different motivations and functions during childhood and adolescence (ie, reducing bedtime fears). For example, Triebenbacher\textsuperscript{3} proposes that children view their pets as close friends and seek comfort from them when trying to sleep. Finally, it is also plausible that individuals who sleep better may be less likely to be disturbed by the presence of a pet, and in turn, more inclined to share their bed (ie, poor sleepers might avoid sharing their bed with their pets, or pets may avoid sleeping with them).

The present study investigated the relation between reported co-sleeping with several sleep dimensions, and found that co-sleeping did not adversely impact any particular sleep dimension. Past studies have focused almost exclusively on sleep duration, nighttime awakenings, and sleep quality. In addition to these sleep dimensions, we observed that youth had comparable bed/wake times, midpoint, and onset latency, regardless of frequency of reported co-sleeping. These results indicate that reported co-sleeping with pets was not linked to more nighttime movement (ie, based on objective actigraphy activity) nor to children’s or parents’ subjective perception of sleep dimensions. The robustness of the results across the comprehensive sleep assessment provides plausible evidence for comparability across co-sleeping groups. This is further supported by the PSG data, which is the gold standard in sleep measurement and less vulnerable to external movement and interference than actigraphy\textsuperscript{38,39}

Future studies should investigate and refine methodology to more accurately capture co-sleeping within dyads. Preliminary research in adults has used dyadic accelerometry in a small sample of dog-human dyads to evaluate the relationship between the dogs’ and humans’ movements\textsuperscript{10}; this should be tested in pet-child dyads and with larger sample sizes. Using simultaneous dyadic accelerometry in combination with PSG would permit more precise evaluation of pets’
impact on sleep and sleep measurement. Findings from the adult couples literature indicate that co-sleeping is associated with more nocturnal activity and reduced slow-wave sleep, however, people still report better sleep satisfaction when sleeping with a partner. This mirrors research in pet-human dyads, which suggest that pet owners prefer to co-sleep with their pets despite worse actigraphy-derived sleep. Greater measurement precision with co-sleeping dyads (ie, both partners wear objective devices) to thoroughly evaluate bedsharing and night-to-night consistency on sleep dimensions is a recommended area of focus for future studies.

While we lack sufficient causal evidence to claim that co-sleeping with pets is beneficial, it did not seem to impair children’s sleep. Overall, reported co-sleeping with pets appeared to be a neutral activity with no demonstrable impact on objectively measured sleep. However, children who reported frequently co-sleeping with pets subjectively experienced better quality sleep; this is consistent with past findings among adults that co-sleeping is associated with improved perceived sleep quality. The effects of co-sleeping may vary across children, and it is possible that the practice may be positive or negative depending on strength of attachment to the pet, presence of anxiety or sleep problems, consistency of sleep routine, or pet characteristics. Additional research is needed to examine children’s perceptions of co-sleeping with pets, and whether this differs across developmental stages throughout childhood and adolescence. Future studies should incorporate these additional social and psychological variables to provide a more complete understanding of pet-human co-sleeping in children.

Approximately 34% of our sample reported sharing a bed with their pet at least occasionally during the preceding month. Similar rates have been observed in other samples, indicating that this is not an isolated phenomenon. Indeed, the prevalence of co-sleeping with pets is consistently high across studies, and it is clearly a common practice among children and adults. There are many potential consequences and benefits of pet-human co-sleeping, but it remains poorly understood. These rates also have significant implications for the larger field of sleep given that 30-50% of individuals share a bed with their pets, and thus, it may be necessary to consider co-sleeping when providing recommendations for treating sleep disorders (eg, sleep hygiene). Furthermore, clinical and sleep researchers rarely assess the presence of pets in the bed or bedroom, which may influence sleep measurement. Sleep assessment methods such as actigraphy and PSG were designed and validated for solitary sleep and it is unclear how they are affected by co-sleeping with another living being. Future research is necessary to clarify these issues.

Strengths and limitations

This study had three limitations that warrant discussion. First, due to the cross-sectional design of the study, causality in the relation between co-sleeping with pets and sleep quality could not be examined. Second, a single item was used to assess co-sleeping with pets. It was not known if children who reported “never” co-sleeping with pets lived in households with no pets or if they simply did not share a bed with their pets (eg, pet slept in the bedroom or elsewhere in the home). There may be differences between pet owners who do not co-sleep with pets and children who do not have pets at all; however, this could not be evaluated in the present study. Other important aspects about the pet (eg, type/species, temperament, size) and pet-human relationship (eg, attachment, time together) may influence co-sleeping between children and their pets and should be investigated in future research.

Third, co-sleeping was measured as the reported frequency of sharing a bed with a pet in the previous month. Consequently, we were unable to determine if participants shared their beds with their pets during the sleep assessment with actigraphy or with ambulatory PSG. Given that data recording took place over a prolonged period (two weeks), it is probable that “frequent” co-sleepers shared their beds with pets during the study, but we did not know how often or on which nights this occurred. PSG recording took place only on the first night of the study so the presence of co-sleeping was less certain; however, the data (ie, lack of group differences) were largely consistent across subjective reports and actigraphy, suggesting that this did not impact the results. Nevertheless, it would be informative to record more than one night of PSG since the monitors are somewhat invasive and it may be more effortful to arrange the leads unobtrusively when co-sleeping with a pet. Ultimately, more standardized methods to assess co-sleeping are needed. Future research should consider including nightly dyadic recording of co-sleeping, combined with objective measurement of the pet’s location (ie, on/off bed, in bedroom) and proximity to the child and bed.

Finally, one significant strength of this study was the use of actigraphy and PSG to complement child- and parent-reported subjective sleep. Using multiple assessment methods yields information about different aspects of sleep and sleep habits and permits a more comprehensive evaluation of comparability across co-sleepers. To the best of our knowledge, this is the first pediatric study to use ambulatory PSG to evaluate sleep in a co-sleeping context.

Conclusion

This is the first study to examine pet-human co-sleeping in children and adolescents using both subjective and objective measures of multiple sleep dimensions. Children who reported sharing their beds with their pets had sleep profiles similar to those who did not. These preliminary findings raise the question of whether co-sleeping with pets is as disruptive as previously thought. Future co-sleeping research should consider the temporal dynamics and spatial proximity of bed partners to determine the causal effects of dyadic sleep.

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