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Original Article

Cross-cultural differences in infant and toddler sleep

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ABSTRACT

Background: To characterize cross-cultural sleep patterns and sleep problems in a large sample of children ages birth to 36 months in multiple predominantly-Asian (P-A) and predominantly-Caucasian (P-C) countries.

Methods: Parents of 29,287 infants and toddlers (*predominantly-Asian countries/regions*: China, Hong Kong, India, Indonesia, Korea, Japan, Malaysia, Philippines, Singapore, Taiwan, Thailand, Vietnam; *predominantly-Caucasian countries:* Australia, Canada, New Zealand, United Kingdom, United States) completed an internet-based expanded version of the Brief Infant Sleep Questionnaire.

Results: Overall, children from P-A countries had significantly later bedtimes, shorter total sleep times, increased parental perception of sleep problems, and were more likely to both bed-share and room-share than children from P-C countries, $p < .001$. Bedtimes ranged from 19:27 (New Zealand) to 22:17 (Hong Kong) and total sleep time from 11.6 (Japan) to 13.3 (New Zealand) hours, $p < .0001$. There were limited differences in daytime sleep. Bed-sharing with parents ranged from 5.8% in New Zealand to 83.2% in Vietnam. There was also a wide range in the percentage of parents who perceived that their child had a sleep problem (11% in Thailand to 76% in China).

Conclusions: Overall, children from predominantly-Asian countries had significantly later bedtimes, shorter total sleep times, increased parental perception of sleep problems, and were more likely to room-share than children from predominantly-Caucasian countries/regions. These results indicate substantial differences in sleep patterns in young children across culturally diverse countries/regions. Further studies are needed to understand the basis for and impact of these interesting differences.

1. Introduction

Sleep patterns evolve rapidly during the first years of life [1] and sleep problems are often a major concern for parents and professionals, especially in the first three years [2,3]. Sleep, however, is not simply a physiological phenomenon with concomitant biological norms. Rather, sleep is influenced by both biological and cultural determinants, and it is the interaction between these two factors that affect the establishment of behavioral and developmental norms [4]. Thus, sleep expectations and perceptions of sleep problems by both parents and healthcare providers are influenced by cultural norms. Without an understanding of sleep characteristics in different cultures, guidance about sleep and what is "normal" or "expected" cannot be provided.

To date, there have been few cross-cultural studies conducted on sleep patterns or sleep problems in young children [5,6]. Most studies that have been conducted are country-specific, and these within-country studies appear to indicate cross-cultural differences. For example, looking specifically at young children, a study of 1129 children ages 1–23 months in China found that overall 66% of these children experienced a sleep problem, with 34% experiencing frequent night wakings, 33% having a sleep latency greater than 30 min, and 59% requiring a parent present at sleep onset [7]. In a study of Taiwanese children (ages 0–6) sleep problems were again common (38% frequent night waking, 70% took 30 min or longer to fall asleep, and 64% of caregivers reported that their child had a sleep problem) [8]. A poll by the National Sleep Foundation in the United States, on the other hand, found that only 10.5% of

Abbreviations: SD, standard deviation; BISQ, Brief Infant Sleep Questionnaire; P-A, predominantly-Asian; P-C, predominantly-Caucasian; AU, Australia; CA, Canada; CN, China; HK, Hong Kong; ID, Indonesia; IN, India; JP, Japan; KR, Korea; MY, Malaysia; NZ, New Zealand; PH, Philippines; SG, Singapore; TH, Thailand; TW, Taiwan; UK, United Kingdom; US, United States; VN, Vietnam.

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239 caregivers of toddlers believed that their child had a sleep problem, although 46.4% of these toddlers were waking on a nightly basis [9].

The difficulty in comparing the results from any country-specific studies is that all have utilized different age groups and all included different questions and varied definitions of sleep problems. These diverse methodologies and definitions make it practically impossible to judge whether sleep varies across cultures and whether there are actual differences in parent-perceived sleep problems. Furthermore, there are limited data available from just a few countries, with lack of any data from most countries/regions in the world. As a start to collecting normative data on young children throughout the world, this study focuses on predominantly-Caucasian (P-C) and predominantly-Asian (P-A) countries/regions in North America, United Kingdom, and Asia-Pacific.

Thus, the primary objectives of this study were to (1) characterize sleep patterns, sleep behaviors, and sleep problems in a large sample of children ages birth to 36 months in multiple P-A and P-C countries/regions and (2) assess sleeping arrangements and parental perceptions of sleep problems in these young children.

2. Methods

2.1. Participants

Parents/caregivers (from hereon referred to as "parents") of 29,287 infants and toddlers (1073 Australia/AU, 501 Canada/CA, 7505 China/CN, 1049 Hong Kong/HK, 3982 India/IN, 967 Indonesia/ID, 1036 South Korea/KR, 872 Japan/JP, 997 Malaysia/MY, 1081, New Zealand/NZ, 1034 Philippines/PH, 1001 Singapore/SG, 896 Taiwan/TW, 988 Thailand/TH, 4505 United States/US, 800 United Kingdom/UK, and 1000 Vietnam/VN) participated in this study. Countries/regions were grouped as either P-C (Australia, Canada, New Zealand, United Kingdom, and United States) or P-A (China, Hong Kong, India, Indonesia, Japan, Korea, Singapore, Malaysia, Philippines, Taiwan, Thailand, and Vietnam).

Children's ages ranged from birth to 36 months. Sample sizes within each country/region were planned to be evenly distributed across age and grouped according to the following age groups: 0–2 month olds, 3–5 month olds, 6–8 month olds, 9–11 month olds, 12–17 month olds, 18–23 month olds, and 24–36 month olds. Exact age was not collected. Sample sizes were based on urban population, with a target of 1000 participants for each country/region with less than 100 million urban inhabitants, 5000 participants for urban populations between 100 and 500 million, and 7500 for those with more than 500 million. Data collection in each country/region was terminated when the target sample size was fulfilled.

2.2. Procedure

All participants completed the Brief Infant Sleep Questionnaire (BISQ) [10,11]. The BISQ has been validated against actigraphy and daily-logs and its sensitivity in documenting expected developmental changes in infant sleep and the effects of environmental factors has been established. The questionnaire included specific questions about infant daytime and nighttime sleep patterns, as well as sleep-related behaviors. Sleeping arrangements (bed-sharing and room-sharing) and bedtime routines were also assessed. The respondents were asked to describe their child's behavior during the last two weeks. The questionnaire was translated into each respective language and back-translated to ensure appropriate translation.

All data were collected online, except for Thailand and Vietnam, where a paper-based version was completed face-to-face with a researcher. In eight countries/regions (Australia, China, India, Malaysia, Singapore, Philippines, United Kingdom, United States), the questionnaire was set as a pop-up screen at a popular parenting website (BabyCenter) and invited parents to complete a sleep survey for children ages birth to 36 months. All other countries/regions utilized a free-standing website for the survey. Recruitment in these areas was conducted via email utilizing mailing lists obtained from local marketing firms and online advertising at other parenting sites and all participants were invited to complete a survey about their child's sleep. The online version used pull-down menus with optional responses for each presented question. Those who completed paper copies of the questionnaire were able to skip questions. Completion of the questionnaire was voluntary and parents were not offered any feedback. A few areas offered incentives for completion (e.g., free samples or gift voucher). The complete sample was collected between May–June 2006 (CA, UK, and US), September–December 2007 (AU, NZ, CN, HK, IN, ID, JP, KR, SG, MY, PH, TH, TW), and April 2008 (VN).

In addition to the BISQ, demographic information was collected, including parental age, education, race, employment status, and child's birth order. For quality control, replies with inappropriate or extreme data (e.g., sleep onset before bedtime, total sleep time < 4 h or total sleep time > 22) were excluded.

2.3. Statistical analyses

Means and frequencies were used for demographic information. Analyses of variance were used to compare sleep variables across countries, with effect sizes (partial eta-squared) reported for all comparisons. A-priori ANOVAs, covarying for birth order, sex, age of respondent, education of respondent, and employment status, were then conducted to compare countries that were P-C to P-A. Additional analyses, covarying for sleep proximity, were also performed. Analyses were performed on the following continuous variables: (1) nighttime sleep; (2) duration and number of night wakings; (3) longest period of consolidated sleep; (4) rise time; (5) total sleep time; (6) daytime sleep (naps); and (7) percent room-sharing, bed-sharing with parent, and sleeping in own room. Chi-square analyses were conducted for categorical variables, including parent perceived (1) sleep problems, (2) bedtime difficulties, and (3) sleep quality. Effect sizes reported for chi-square analyses are phi (ϕ). Because of the large cohort size and the multiple analyses, findings were considered significant if $p < .001$.

3. Results

3.1. Demographics

Complete demographic data for the entire sample, and within P-A and P-C, are provided in Table 1. Overall, there were equal boys (48.1%) and girls (51.9%), $\chi^2 = 0.053$, $p = .82$. The majority of the respondents were mothers (89.7%). The majority of respondents (75.7%) were between 25 and 35 years old, most had some college education (83.7%), and the majority were employed full-time (52.1%). There were significant differences between P-A and P-C for birth order, sex, age of respondent, education of respondent, and employment status, $p < .001$.

3.2. Sleep patterns

Data on nighttime (Table 2) and daytime (Table 3) sleep are presented for each country/region. Furthermore, Fig. 1 presents total sleep time across countries/regions. All sleep measures significantly differed across country/region, $p < .0001$. Comparisons for all variables were also significant between P-C and P-A, $p < .0001$ (Table 4). Overall, young children in P-A had later bedtimes, later

Table 1
Demographics.

	Total %	Predominantly Caucasian %	Predominantly Asian %	χ^2	Effect size ϕ
Sex				0.05	.00
Boy	51.94	52.05	51.90		
Girl	48.06	47.95	48.10		
Birth order				1136.04**	.20
Oldest	26.43	14.21	30.99		
Youngest	19.80	28.88	16.41		
Only	50.43	53.67	49.22		
Middle/ multiple	3.34	3.24	3.38		
Respondent				683.75**	.15
Mother	89.74	97.25	86.94		
Other	10.26	2.75	13.06		
Employment status					
Full-time	52.11	29.86	60.41	2445.99**	.29
Part-time	7.72	15.36	4.86		
Home/ student	40.18	54.77	34.73		
Education				63.89**	.05
Elementary school	1.15	1.43	1.05		
High school	40.16	42.45	39.31		
College	41.50	38.15	42.76		
Post-graduate	17.18	17.97	16.88		
Age of respondent				1341.03**	.21
25–29	37.14	28.15	40.49		
30–34	38.56	34.63	40.03		
35–39	13.94	18.11	12.38		
<25 or >40	9.66	18.38	6.40		

** $p < .000$.

Table 2
Nighttime sleep variables across country.

Country	Bedtime (hours) M (SD)	Number of wakings M (SD)	Duration of wakings (hours) M (SD)	Longest sleep (hours) M (SD)	Rise time (hours) M (SD)	Nighttime sleep (hours) M (SD)
AU	19.71^{ck} (1.12)	1.23^{ef} (1.21)	.44^{d} (.60)	7.93^{de} (2.94)	6.59^{f} (.99)	10.17^{c} (1.46)
CA	20.74^{h} (1.19)	1.24^{ef} (1.37)	.41de (.58)	7.84^{e} (2.91)	–	9.96^{d} (1.52)
CN	20.95^{f} (1.03)	1.78^{b} (1.28)	.52^{bc} (.72)	8.11^{cd} (2.75)	6.90^{e} (1.01)	9.49^{f} (1.24)
HK	22.29^{a} (1.09)	1.10^{g} (1.10)	.46^{d} (.83)	7.81^{e} (2.56)	7.78^{b} (1.38)	9.02^{j} (1.46)
ID	20.45^{i} (.97)	1.97^{a} (1.31)	.68^{a} (.82)	7.10^{g} (2.90)	5.93^{g} (1.18)	9.15^{i} (1.36)
IN	22.19^{b} (1.11)	2.07^{a} (1.57)	.72^{a} (1.02)	5.65^{i} (2.90)	7.19^{d} (1.35)	9.15^{ci} (1.35)
JP	21.29^{e} (1.07)	1.25^{def} (1.25)	.28^{g} (.42)	8.23^{c} (2.82)	7.13^{d} (.97)	9.42^{fg} (1.09)
KR	22.10^{b} (1.16)	1.50^{c} (1.31)	.34^{fg} (.65)	7.88^{e} (2.84)	7.98^{a} (1.21)	9.42^{fg} (1.25)
MY	21.79^{c} (1.10)	1.54^{c} (1.25)	.47^{cd} (.72)	6.95^{g} (2.84)	7.47^{c} (1.21)	9.19^{ci} (1.54)
NZ	19.46^{l} (.92)	.93^{h} (1.09)	.33^{fg} (.53)	8.88^{a} (2.91)	6.66^{f} (.74)	10.61^{a} (1.35)
PH	20.85^{g} (1.30)	1.60^{c} (1.28)	.54^{b} (.81)	7.16^{fg} (2.77)	6.87^{e} (1.42)	9.15^{i} (1.58)
SG	21.63^{d} (1.20)	1.35^{d} (1.24)	.41de (.63)	7.28^{f} (2.72)	7.47^{c} (1.21)	9.26^{hi} (1.54)
TH	20.88^{fg} (1.19)	1.58^{c} (1.16)	.33^{fg} (.50)	7.07^{fg} (2.73)	6.87^{e} (1.4)	9.90^{d} (1.31)
TW	22.15^{b} (1.10)	1.33^{de} (1.39)	.45^{d} (.80)	7.19^{fg} (2.97)	7.70^{b} (1.51)	8.73^{ck} (1.86)
UK	19.91^{j} (1.09)	1.06^{g} (1.08)	.37^{ef} (.60)	8.60^{b} (2.96)	–	10.51^{b} (1.56)
US	20.87^{fg} (1.15)	1.15^{fg} (1.13)	.42de (.68)	7.79^{e} (2.83)	–	9.74^{e} (1.59)
VN	21.73^{c} (1.12)	1.54^{c} (1.32)	.36^{ef} (.47)	5.93^{h} (2.75)	7.18^{d} (1.05)	9.32^{gh} (1.12)
ANOVA	798.22**	174.40**	59.98**	180.04**	219.88**	240.91**
Effect size	.30	.09	.03	.09	.11	.12

Column means with the same letters are not significantly different (Duncan's post hoc test).
– Data not collected.
** $p < .0001$.

rise times, less nighttime sleep, and less total sleep times. Interestingly, there were significant differences in daytime sleep, but minimal effect sizes for both duration and number of naps. Furthermore, Fig. 2 presents both bedtimes and total nighttime sleep across age groups for P-A and P-C, presenting an interesting developmental picture. In children living in P-A countries/regions, bedtime is consistent across age groups, whereas in P-C countries bedtime decreases from birth to 6 months and remains relatively stable. Naps across development are also depicted in Fig. 2, indicating parallel changes with age in both cultures.

3.3. Sleep setting

As expected, there were significant differences in sleep setting for the infants and toddlers across country/region (Table 5) and culture (Table 4). Young children in P-A countries were significantly more likely to sleep in their parents' room and sleep in their parents' bed. Children were less likely to bed-share in all countries than to room-share. As depicted in Fig. 2, room-sharing was more common for P-C children in the first few months and then decreased with age. In comparison, room-sharing was stable across all ages in P-A households. Additional ANOVAs covarying for sleep proximity (room-sharing and bed-sharing), as well as demographic variables, were calculated comparing all variables between P-C and P-A. All significant differences were maintained at $p < .001$, except for longest sleep, which was no longer statistically significant.

3.4. Parentally-defined sleep problems

In addition to significant differences in sleep patterns, there were also significant country/region-based differences in parental perceptions of sleep problems (Table 5). Parents' perceptions that their child has a "small" or "severe" sleep problem ranged from 10.1% (Vietnam) to 75.9% (China). Similar differences were seen in whether parents perceived bedtime as difficult, ranging from 7.0% (Thailand) to 46.7% (Indonesia) across all countries/regions, and whether they believed that their child sleeps well (42.7%/China to 80.6%/Thailand). Overall, parents from P-A countries/regions were more likely to view their child as having a sleep problem (51.9% vs. 26.3%), that bedtime was more difficult (22.3% vs. 14.3%), and were less likely to perceive their child as having slept well (56.4% vs. 73.6%), $p < .0001$.

4. Discussion

This is the only large-scale, cross-cultural survey of infant and toddler sleep to date, and involves a large cohort of P-C and P-A children across 17 countries/regions. The size of the cohort enabled powerful analyses of differences across countries/regions and across cultures.

The most striking results of this study were the vast differences in bedtimes and total sleep times across countries/regions, even after controlling for demographic differences. Across all countries/regions, bedtimes varied by almost 3 h (170 min) and total

Table 3
Daytime sleep across country.

Country	Number of naps M (SD)	Daytime sleep (hours) M (SD)	Total sleep time (hours) M (SD)
AU	2.16^{c} (1.08)	2.99^{gh} (1.68)	13.16^{ab} (1.87)
CA	1.97^{g} (1.17)	2.90^{hi} (1.61)	12.87^{de} (1.99)
CN	1.97^{g} (1.12)	3.00^{gh} (1.69)	12.49^{gh} (1.93)
HK	2.11^{cd} (1.09)	3.14^{ef} (1.79)	12.16^{ci} (2.10)
ID	2.01^{fg} (1.02)	3.36^{c} (1.72)	12.57^{fg} (2.16)
IN	2.45^{a} (1.01)	3.41^{cd} (1.72)	11.83^{j} (2.51)
JP	1.44^{j} (.82)	2.19^{m} (1.29)	11.62^{k} (1.48)
KR	1.64^{i} (.97)	2.49^{l} (1.41)	11.90^{j} (1.72)
MY	2.27^{b} (1.18)	3.27^{de} (1.88)	12.46^{gh} (2.38)
NZ	1.83^{h} (1.08)	2.70^{jk} (1.63)	13.31^{a} (1.84)
PH	2.24^{b} (1.24)	3.53^{b} (1.89)	12.69^{ef} (2.37)
SG	2.08^{def} (1.12)	3.11^{fg} (1.80)	12.36^{h} (2.23)
TH	1.69^{i} (.88)	2.81^{ij} (1.53)	12.71^{ef} (2.06)
TW	2.12^{cd} (1.07)	3.34 (1.87)	12.07^{i} (2.39)
UK	1.95^{g} (1.15)	2.61^{kl} (1.79)	13.10^{bc} (2.03)
US	2.09^{cde} (1.14)	3.18^{ef} (1.82)	12.93^{cd} (2.09)
VN	2.02^{efg} (1.09)	3.67^{a} (1.88)	12.99^{bcd} (2.19)
ANOVA	96.70**	45.69**	68.17**
Effect size	.05	.02	.04

Column means with the same letters are not significantly different (Duncan's post hoc test).
** $p < .0001$.

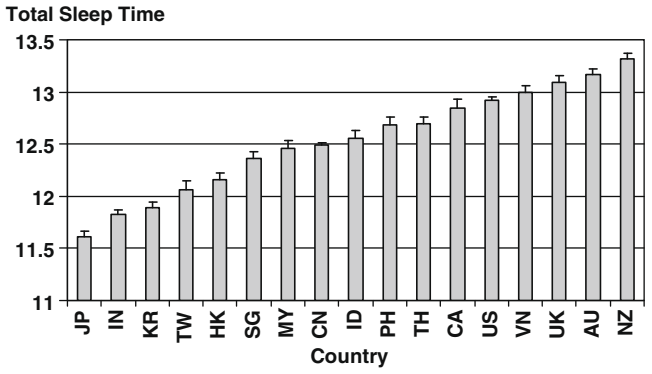

Fig. 1. Total sleep time across country.

sleep times varied by 101 min (11.62 h in Japan compared to 13.31 h in New Zealand). Thus, many children in P-A countries/regions are obtaining significantly less overall sleep and are not compensating for much later bedtimes. On the other hand, minimal differences were found for daytime sleep (naps), with all children in this study following the same maturational pattern in napping behaviors. Thus, these results indicate a strong biological contribution to daytime sleep, rather than what appears to be a stronger culturally-based influence to nighttime sleep. These results are consistent with previous findings that daytime sleep is less likely influenced by ecological factors than nighttime sleep [11].

As expected, there were also differences in sleep-related parenting practices. For example, most parents reported instituting a bedtime routine most nights of the week, although it varies from just 40% in India to 80% in United Kingdom. There were also differences in sleeping arrangements. Consistent with prior studies, young children living in P-A areas were much more likely to bed-share and room-share than those in P-C areas. It is interesting to note that although room-sharing was practiced by most families living in P-A countries/regions, there are greater differences in bed-sharing, with countries such as Hong Kong and Singapore much more likely to place their child on a separate sleeping surface within the same room. These differences in sleeping arrangements mirror

Table 4
Sleep measures of predominantly Caucasian and predominantly Asian.

	Predominantly Caucasian M (SD)	Predominantly Asian M (SD)	F	Effect size Cohen's d
Bedtime	20.42 (1.26)	21.44 (1.25)	3431.91**	.81
Number of wakings	1.13 (1.15)	1.69 (1.36)	1579.16**	.44
Duration of wakings	.41 (.64)	.52 (.78)	282.55**	.15
Longest sleep	8.02 (2.92)	7.23 (2.97)	812.34**	.27
Nighttime sleep	10.00 (1.56)	9.19 (1.49)	149.5.12**	.53
Number of naps	2.04 (1.13)	2.06 (1.21)	382.84**	.02
Daytime sleep	3.01 (1.77)	3.11 (1.78)	199.22**	.06
Rise time	6.63 (.87)	7.11 (1.25)	211.16**	.45
Total sleep time	13.02 (2.01)	12.31 (2.17)	303.14**	.34
			χ^2	Effect size ϕ
Parent's bed	11.80%	64.65%	6476.19**	.47
Parent's room	21.95%	86.47%	11269.83**	.62
Own room	62.54%	7.03%	10369.22**	.60
Sleeps well	73.57%	56.43%	1990.41**	.26
Consistent bedtime routine (>4 nights/ week)	60.65%	71.13%	274.91**	.10
Sleep latency (>30 min)	9.57%	19.29%	1888.70**	.25
Bedtime difficulty	14.29%	22.17%	1821.78	.25
Sleep problem	26.30%	51.90%	1900.73**	.25

** $p < .0001$.

other culturally-based values. That is, countries that value family interdependence typically promote room-sharing compared to those who emphasize independence [12].

Another finding of interest was that parentally-defined sleep problems are clearly a universal issue. Parents in all 17 countries/regions reported significant sleep issues. Surprisingly, though, some of the largest country/region-based differences were how sleep was perceived as a problem by parents, ranging from a low of 10.1% in Vietnam to 75.9% in China. Overall, parents from P-A areas (51.9%) perceive significantly more sleep problems than those who live in P-C countries (26.3%). Thus, approximately one-half of all parents in P-A countries/regions and one-quarter of parents in P-C countries perceive that their child has a sleep problem. Similar results were found for parents' perceptions of difficulty at bedtime (range: 9.4–46.7%) and their overall perception that their child sleeps well (range: 42.7–80.6%). These differences in parental perceptions of whether sleep behaviors are considered problematic or normal have previously been discussed as primarily based on cultural norms [4]. Thus, parents within this study may have vastly different interpretations of whether a child is conforming to culturally-based expectations, in addition to any actual differences in the prevalence of sleep problems.

Overall, the results of this study raise more questions than answers. The most important questions to follow are whether these differences matter and what the environmental and biological bases are for these differences. Considering the first point, much still needs to be determined in terms of (1) whether there are biological differences contributing to these results or if these differences are solely culturally-based (e.g., Just like there is individual variability in sleep need, is there also racial/ethnic variability in sleep need?), (2) whether children in certain parts of the world are actually getting enough sleep (e.g., Do children in Korea need less sleep than those in New Zealand?), (3) whether these sleep differences impact daytime behavior (e.g., Do children in countries such as Japan and India experience more daytime sleepiness and

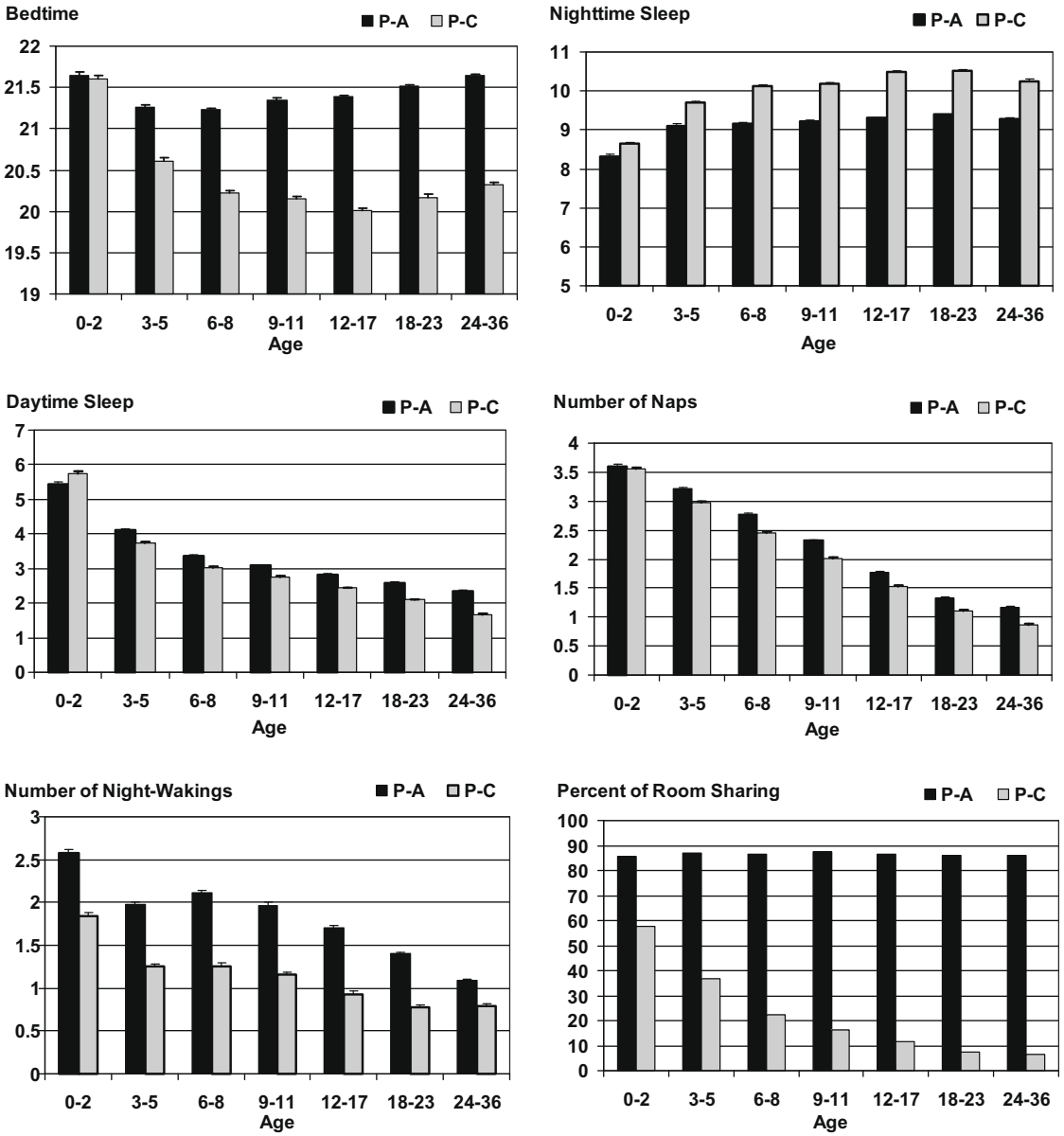

Fig. 2. Sleep across age group for P-A compared to P-C for mean bedtime, nighttime sleep, total daytime sleep, number of naps, number of nightwakings, and prevalence of room-sharing.

related behavior problems as a result of less overall sleep?), and (4) whether these differences in parental perceptions reflect real differences in problem behaviors (e.g., Do children in China actually have more sleep problems, or is this simply a result of culturally-based expectations?).

Finally, there are a number of limitations to this study that must be considered. First, as can be expected from a primarily internet-based survey, the cohort in this study is skewed toward higher education. This bias, however, was likely consistent across almost all countries and we believe that we obtained similar segments of the population within each country/region. In addition, these results are likely not representative of all infants and toddlers within each country. We expect that this sample represents more urban-based populations, especially in the P-A countries, given the need for internet access to participate. Nevertheless, we do note that our findings are very similar to the results of other studies that have utilized traditional (non-computerized) surveys in many of the countries surveyed. For example, similar bedtimes and total sleep times were found comparing our results to studies conducted in China [7], Japan [13], Taiwan [8], and the United States [14]. Total nighttime sleep was also consistent with another recent study in the United States [9]. These results are also consistent with developmental trends in other countries not included in our sample, such as Switzerland [15]. Given that this was primarily a web-based study, it was also not possible to control for the possibility that participants completed the survey more than once or that the person actually had a child. But cases with unreasonable responses were removed to exclude random or inconsistent data entry. This is an inherent limitation to web-based surveys. Finally, parents with concerns about their child's sleep may have been more likely to participate, but again it is expected that these differences are likely consistent across all participants. Related to this issue, we cannot exclude the possibility that those respondents who completed the questionnaire on paper (in Vietnam and Thailand) responded differently or have different characteristics from those that responded online.

Table 5
Sleep setting and parent perception of sleep problems (%).

Country	Own room	Parents' room	Parents' bed	Consistent bedtime routine (>4 nights/week)	Sleep latency (>30 min)	Sleeps well	Bedtime difficulty	Sleep problem
AU	68.44	26.98	8.57	75.30	6.52	73.16	12.77	31.68
CA	67.33	15.14	12.38	69.06	10.18	72.86	14.77	29.94
CN	5.04	88.74	67.59	66.52	18.15	42.72	21.51	75.93
HK	25.38	67.05	27.55	72.55	18.87	49.57	23.54	66.82
ID	9.72	81.90	70.73	65.66	17.47	56.57	46.74	38.99
IN	5.32	88.30	72.63	40.13	19.97	64.69	25.67	39.61
JP	2.98	88.07	69.72	72.71	22.71	78.56	28.44	19.61
KR	8.71	83.35	61.39	66.02	23.85	44.79	29.06	46.91
MY	8.53	84.05	44.03	52.75	22.46	63.59	20.16	44.73
NZ	76.39	17.84	5.83	81.96	5.64	72.99	9.53	29.69
PH	6.58	86.56	65.09	52.03	26.69	78.92	16.83	31.24
SG	19.28	73.73	35.86	59.74	21.88	64.64	17.58	43.96
TH	1.01	94.54	77.23	71.46	10.42	80.56	6.98	10.83
TW	6.12	88.44	60.16	61.50	23.44	47.55	14.73	71.65
UK	63.67	25.97	5.00	80.38	8.13	74.38	12.25	22.63
US	57.06	21.81	15.14	66.13	11.43	73.76	16.09	24.44
VN	2.10	94.30	83.20	71.00	4.80	73.70	9.40	10.10
χ^2	10,910**	11,647**	8242**	4244**	2551**	4137**	3937**	9546**
Effect size (ϕ)	.60	.62	.52	.38	.29	.37	.37	.56

** $p < .0001$.

As always, the reliance on parental reports in assessing infant sleep has inherent limitations. For example, parents' awareness of night wakings is largely influenced by the child's tendency to signal (e.g., cry or call for attention) [16–18]. Interestingly, although sleep proximity, i.e., room-sharing and bed-sharing, could be expected to influence parental report of nighttime sleep problems, this was not found to be the case. Furthermore, although all questionnaires were back-translated, there is concern that the precise meaning of specific terms, such as "sleep problem," may differ across languages and across cultures. Given that these cross-cultural differences are based on parental perceptions that are likely to be influenced by cultural influences, future studies should include more objective measures of sleep to overcome the language and cultural perceptual biases.

Finally, the conclusions made in this paper are broad interpretations of cultural differences. This study found significant differences within the simplistically determined "predominantly-Caucasian" (P-C) and "predominantly-Asian" (P-A) regions, but there are also likely vast subcultural and ethnic differences within each country and each culture. For example, there are known to be over 50 different minorities in China, and Malaysia is comprised of three dominant populations (Malay, Chinese, and Indian) as well as more than 50 different ethnic groups [19]. Thus, individual variability within these large catchment areas must be considered when interpreting the applicability of these results to any specific child.

5. Conclusions

Overall, these results indicate substantial cross-cultural differences in sleep patterns in young children. In this study, infants and toddlers in P-A countries obtain less overall sleep, have later bedtimes, are more likely to room-share, and are perceived to have more sleep problems than young children in P-C countries. In contrast, minimal differences were found in daytime sleep (naps). In addition, between 25% and 50% of parents across these parts of the world perceive their child as having a sleep problem, an area that clearly needs to be addressed by health care practitioners worldwide. Furthermore, clinicians in the field of pediatric sleep should develop a culturally-sensitive perception and intervention approach. These results provide a cultural perspective that can serve clinician awareness of normative parenting practice of room-sharing in P-A countries that may also be related to practices or beliefs held by immigrants from these countries. It also suggests that complaints about young children's sleep could be highly dependent on cultural expectations and norms and should be assessed individually on the basis of the actual sleep difficulties of the child. Finally, further studies are needed to understand the basis for and the impact of these striking differences, as well as to expand our study of infant and toddler sleep to other areas of the world (e.g., Latin America, Europe, Africa).

Disclosure

Jodi Mindell has served as a consultant and speaker for Johnson & Johnson. Avi Sadeh has served as a consultant for Johnson & Johnson. Daniel Goh has served as a speaker for Johnson & Johnson. Benjamin Wiegand and Ti Hwei How are employees of Johnson & Johnson. No products, however, are discussed or included in this manuscript.

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