

# Regulations to Promote Healthy Sleep Practices in Child Care

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## KEY WORDS

child care, obesity, policy, regulations, sleep

## ABBREVIATIONS

IOM—Institute of Medicine

SIDS—Sudden Infant Death Syndrome

Dr Benjamin Neelon conceived of and designed the study, conducted the regulations review, and drafted the initial manuscript; Drs Duffey and Slining conducted the regulations review and reviewed and edited the manuscript; and all authors approved the final manuscript as submitted.

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**WHAT'S KNOWN ON THIS SUBJECT:** Previous studies have examined state regulations for child care facilities and found substantial variation among states. None of these studies examined regulations related to healthy sleep practices, which is an important and often overlooked intervention target for obesity prevention.



**WHAT THIS STUDY ADDS:** We reviewed state regulations related to healthy sleep in child care and compared them to recent national recommendations put forth by the Institute of Medicine. We found that many states lacked regulations, highlighting an important and timely opportunity for improvement.

## abstract



**OBJECTIVES:** The purpose of this study was to assess state licensing and administrative regulations promoting healthy sleep practices in child care and to compare these regulations to national recommendations.

**METHODS:** We reviewed regulations related to healthy sleep practices for all states and territories for both child care centers (centers) and family child care homes (homes). We compared regulations with Institute of Medicine recommendations to promote sleep in child care, including (1) create environments that ensure restful sleep; (2) encourage sleep-promoting behaviors and practices; (3) encourage practices that promote child self-regulation of sleep; and (4) seek consultation yearly from a sleep expert. We used Cochran-Mantel-Haenszel trend tests to assess associations between geographic region and number of regulations consistent with the recommendations.

**RESULTS:** The mean number of regulations for states was 0.9 for centers and 0.8 for homes out of a possible 4.0. For centers, no state had regulations for all 4 recommendations; 11 states had regulations for 2 of the 4 recommendations. For homes, 9 states had regulations for 2 of the recommendations. States in the Northeast had the greatest mean number of regulations for centers (1.2) and homes (1.1), and states in the South had the fewest (0.7 and 0.7, respectively); these geographic differences were significant for centers ( $P = .03$ ) but not homes ( $P = .14$ ).

**CONCLUSIONS:** More states in the Northeast had regulations consistent with the Institute of Medicine sleep recommendations, but overall few states had regulations consistent with the recommendations. *Pediatrics* 2014;134:1167–1174

Insufficient sleep is associated with a number of adverse health outcomes in childhood, including impaired cognition, diminished impulse control, and behavioral problems.<sup>1-3</sup> Short sleep duration has also been associated with obesity in childhood in both cross-sectional and longitudinal studies.<sup>4-6</sup> The mechanisms linking insufficient sleep to obesity are, in part, related to the hormonal regulation of hunger and satiety. Experimental studies in adults have shown that sleep restriction resulted in reduced levels of leptin, a hormone that suppresses appetite, and increased levels of ghrelin, a hormone that stimulates appetite.<sup>7,8</sup> Inadequate sleep may also interfere with metabolic processes related to glucose metabolism,<sup>9,10</sup> which can influence the development of obesity. Insufficient sleep, even in childhood, may contribute to poor dietary choices, leading to the consumption of low nutrient, high energy density foods.<sup>11,12</sup> Short sleep duration may also impact energy expenditure, if those who are tired are less physically active and engage in more sedentary behaviors.<sup>13-16</sup>

A number of studies have examined sleep in early childhood, a time when sleep patterns change often and poor sleep habits may develop.<sup>3,17-23</sup> Taveras and colleagues reported a twofold higher prevalence of obesity among infants and toddlers who slept less than 12 hours per day, compared with those who slept more, and observed a distinct dose-response relationship between sleep duration and obesity.<sup>19</sup> Bell et al found that inadequate nighttime sleep, defined by age-specific sleep duration below the 25th percentile, was associated with subsequent obesity in children younger than 4 years of age.<sup>20</sup> A study in the United Kingdom found that inadequate sleep duration <10.5 hours per day at age 3 years was associated with obesity at age 7 years.<sup>18</sup> Furthermore, results from the Toyama Birth Cohort Study suggest that 3-year-old children who slept <9 hours per day were more likely to be obese than children who slept  $\leq$ 11 hours.<sup>17</sup>

A number of studies have also examined environmental and behavioral factors related to sleep, including television and screen time viewing, the presence of a television in the bedroom, noise and light disturbances, urban living, inconsistent sleep schedules, and poor or irregular sleep routines, and found relationships with excessive weight gain and obesity.<sup>24-29</sup> Television and screen time viewing and the presence of a television in the bedroom, in particular, negatively influenced sleep duration in young children.<sup>24-27</sup> Wilson et al examined sleep environments of preschool-aged children and found that environments that were too hot, cold, bright, or loud decreased nighttime sleep duration by 27 minutes.<sup>29</sup> Thus, efforts to improve the environments where children sleep are warranted, and may include both the family home and child care settings. Because nearly 13 million young children in the United States spend time in out-of-home child care,<sup>30,31</sup> this setting has emerged as an important target for obesity prevention.<sup>32,33</sup>

In 2011, the Institute of Medicine (IOM) released policy-based recommendations to help prevent obesity in young children, including specific recommendations related to sleep duration and sleep hygiene.<sup>34</sup> The IOM report included recommendations for state licensing and administrative agencies to regulate healthy sleep practices in child care. Little is known about the extent to which the new IOM recommendations are being implemented by states. The purpose of this study was to review state regulations related to sleep behavior in child care, assess consistency with the IOM recommendations, and explore geographic differences in states meeting the IOM recommendations.

## METHODS

### Overview

For this cross-sectional study, we compared existing state licensing and ad-

ministrative regulations to recent national recommendations to promote healthy sleep practices in child care, excluding sleep regulations related to the prevention of Sudden Infant Death Syndrome (SIDS). Because this study was a policy review and did not involve human subjects, ethical approval was not required by Duke University Medical Center.

### Sleep Recommendations

We identified 1 overarching recommendation from the IOM policy report that targeted healthy sleep practices related to obesity prevention for children in child care. The recommendation stated that “child care regulatory agencies should require child care providers to adopt practices that promote age-appropriate sleep durations among young children.”<sup>34</sup> The IOM noted 4 potential actions (“recommendations”) to achieve this goal, including (1) create environments that ensure restful sleep, such as no screen media in rooms where children sleep and low noise and light levels during napping; (2) encourage sleep-promoting behaviors and practices, such as calming naptime routines and avoiding stimulating or stressing children just before naptime; (3) encourage practices that promote child self-regulation of sleep, including putting infants to sleep drowsy but awake and helping older children identify feelings of sleepiness; and (4) seek consultation yearly from an expert on healthy sleep durations and practices.<sup>34</sup> These overarching recommendations are not age-specific but encourage healthy sleep practices in all children in child care.

### State Regulations Review

We reviewed each state’s licensing and administrative regulations for child care facilities between August and December of 2013, focusing on regulations consistent with the IOM recommendations. A trained reviewer (Dr Neelon) searched 2 sources for regulations using primary legal research methods: a publically

available Web site maintained by the National Resource Center for Health and Safety in Child Care in partnership with the American Academy of Pediatrics,<sup>55</sup> and the commercial legal research database WestlawNext. Each state's regulations were coded by the reviewer using a combination of Boolean keyword searches and review of the full text.<sup>56</sup> Two additional reviewers (Drs Duffey and Slining) conducted separate reviews using the National Resource Center Web site; their reviews were collapsed and compared with the first review as a measure of quality control. Agreement between the primary reviewer and the secondary reviewers was >85% for each recommendation. We reconciled differences through a collective discussion of the wording of the regulation until all reviewers were in agreement. To be counted, regulations needed to include clear and specific language embodying the spirit of the IOM recommendations. We reviewed regulations for all 50 US states, the District of Columbia, Puerto Rico, the US Virgin Islands, Guam, and the Department of Defense. The Department of Defense child care regulations govern facilities in residential areas for US soldiers and their dependents stationed both domestically and overseas. We documented regulations consistent with each of the 4 IOM recommendations for healthy sleep practices in child care. We also recorded the date of the most recent revision or update to evaluate if the regulation was adopted before or after the release of the IOM recommendations.

We reviewed regulations for both child care centers ("centers") and family child care homes ("homes"). Generally, centers care for a greater number of children, have 3 or more staff members, and are located in a dedicated building. Homes, on the other hand, typically care for fewer children and include a single care provider who is

often the homeowner. Some states regulate subcategories of centers and homes, such as infant care centers or large family child care homes. Where appropriate, we grouped these types of facilities into either "centers" or "homes" for the purpose of reporting results of this review. For example, we classified infant care centers as centers and large family child care homes as homes.

### Analysis

We computed means, frequencies, and SD for the number of regulations for each state according to type of facility. We also categorized states (not including the District of Columbia, the Department of Defense, or the US territories) by geographic census region: Northeast, South, Midwest, and West. We used Cochran-Mantel-Haenszel trend tests to compute correlations between the geographic region of the state and the number of regulations consistent with IOM recommendations, treated as an ordinal variable ranging from 0 to 4 regulations. Next, we used Cochran-Mantel-Haenszel trend tests to explore associations between the dichotomized year variable (before the release of the IOM recommendations versus after the release) and number of regulations in each state. Additionally, we computed Spearman correlation coefficients to examine year of last update, treated as a continuous variable, and the number of regulations in each state. We conducted all analyses by using SAS 9.2 (SAS Institute, Inc, Cary, NC), with a significance level of  $\alpha = 0.05$ .

## RESULTS

### Overview

Overall, few states had regulations related to healthy sleep, beyond those aimed at preventing SIDS (Table 1). The mean (SD) number of regulations for states was 0.9 (0.7) for centers and 0.8 (0.7) for homes. No state had regu-

lations for all 4, or even 3 of the sleep recommendations for centers or homes. For centers, Arizona, California, Illinois, Massachusetts, Michigan, New Mexico, Oregon, Tennessee, Texas, Utah, and Vermont had regulations for 2 of the 4 recommendations. For homes, Massachusetts, New Mexico, North Dakota, Oregon, Texas, Utah, Vermont, Virginia, and West Virginia had regulations for 2 of the 4 recommendations. Thirty-three states had regulations for centers and 31 had regulations for homes consistent with the recommendation to encourage practices that promote sleep self-regulation. The second most common regulation was related to creating environments that ensure restful sleep. Fifteen states had center regulations and 11 had home regulations consistent with that recommendation. Virginia was the only state with a regulation encouraging sleep-promoting behaviors (homes only) and no states had a regulation requiring consultation from a sleep expert.

When we examined geographic differences, we found that states in the Northeast had the greatest mean (SD) number of regulations, which was 1.2 (0.4) for centers and 1.1 (0.6) for homes. This is in contrast to the South, which had the fewest mean (SD) number of regulations: centers 0.7 (0.7) and homes 0.8 (0.8). The association between geographic region and number of regulations was significant for centers ( $P = .03$ ), but not for homes ( $P = .14$ ). Nineteen states for centers and homes had updated their regulations in 2012 or 2013, after the IOM recommendations were released (Table 2). The year of last update examined as a dichotomized variable (before the recommendations were released versus after) was not associated with the number of regulations consistent with IOM recommendations for centers ( $P = .71$ ), but was for homes ( $P = .03$ ). Similarly, the number of regulations as not correlated with the year of last update examined as a continuous variable for centers (Spearman's

**TABLE 1** State Regulations for Child Care Centers and Family Child Care Homes Consistent With Institute of Medicine Sleep Recommendations

State	Facility Type	Year of Last Update	Create Environments That Ensure Restful Sleep	Encourage Sleep-Promoting Behaviors	Encourage Practices That Promote Sleep Self-Regulation	Seek Consultation Yearly From Sleep Expert
AL	Centers	2007	—	—	X	—
	Homes	2007	—	—	—	—
AK	Centers	2007	—	—	—	—
	Homes	2007	—	—	—	—
AZ	Centers	2010	X	—	X	—
	Homes	2011	—	—	X	—
AR	Centers	2011	—	—	—	—
	Homes	2011	—	—	—	—
CA	Centers	2008	X	—	X	—
	Homes	2009	—	—	—	—
CO	Centers	2012	—	—	X	—
	Homes	2012	—	—	X	—
CT	Centers	2013	—	—	X	—
	Homes	2013	—	—	—	—
DE	Centers	2007	—	—	X	—
	Homes	2009	—	—	—	—
FL	Centers	2010	—	—	—	—
	Homes	2010	—	—	—	—
GA	Centers	2013	X	—	—	—
	Homes	2012	X	—	—	—
HI	Centers	2002	X	—	—	—
	Homes	2002	—	—	—	—
ID	Centers	2011	—	—	—	—
	Homes	2011	—	—	—	—
IL	Centers	2010	X	—	X	—
	Homes	2010	—	—	X	—
IN	Centers	2003	—	—	X	—
	Homes	2001	—	—	X	—
IA	Centers	2012	—	—	—	—
	Homes	2012	—	—	—	—
KS	Centers	2012	—	—	X	—
	Homes	2012	—	—	X	—
KY	Centers	2008	—	—	—	—
	Homes	2008	—	—	—	—
LA	Centers	2012	—	—	—	—
	Homes	—	—	—	—	—
ME	Centers	2008	—	—	X	—
	Homes	2009	—	—	X	—
MD	Centers	2012	—	—	—	—
	Homes	2012	—	—	X	—
MA	Centers	2010	X	—	X	—
	Homes	2010	X	—	X	—
MI	Centers	2008	X	—	X	—
	Homes	2009	—	—	—	—
MN	Centers	2010	X	—	—	—
	Homes	2007	—	—	—	—
MS	Centers	2009	—	—	—	—
	Homes	2009	—	—	—	—
MO	Centers	2011	—	—	X	—
	Homes	2011	—	—	X	—
MT	Centers	2012	—	—	X	—
	Homes	2012	—	—	X	—
NE	Centers	2013	—	—	—	—
	Homes	2013	—	—	—	—
NV	Centers	2012	—	—	X	—
	Homes	2012	—	—	X	—
NH	Centers	2008	—	—	X	—
	Homes	2008	—	—	X	—
NJ	Centers	2009	—	—	X	—
	Homes	2009	—	—	X	—

TABLE 1 Continued

State	Facility Type	Year of Last Update	Create Environments That Ensure Restful Sleep	Encourage Sleep-Promoting Behaviors	Encourage Practices That Promote Sleep Self-Regulation	Seek Consultation Yearly From Sleep Expert
NM	Centers	2012	X	—	X	—
	Homes	2012	X	—	X	—
NY	Centers	2005	—	—	X	—
	Homes	2005	—	—	X	—
NC	Centers	2013	—	—	X	—
	Homes	2013	—	—	X	—
ND	Centers	2013	—	—	X	—
	Homes	2013	X	—	X	—
OH	Centers	2010	—	—	X	—
	Homes	2011	—	—	X	—
OK	Centers	2010	—	—	X	—
	Homes	2010	—	—	—	—
OR	Centers	2011	X	—	X	—
	Homes	2011	X	—	X	—
PA	Centers	2009	X	—	—	—
	Homes	2009	X	—	—	—
RI	Centers	1993	—	—	X	—
	Homes	2007	—	—	X	—
SC	Centers	2005	—	—	X	—
	Homes	2005	—	—	X	—
SD	Centers	2013	—	—	—	—
	Homes	2013	—	—	—	—
TN	Centers	2009	X	—	X	—
	Homes	2009	—	—	X	—
TX	Centers	2013	X	—	X	—
	Homes	2013	X	—	X	—
UT	Centers	2013	X	—	X	—
	Homes	2013	X	—	X	—
VT	Centers	2001	X	—	X	—
	Homes	2001	X	—	X	—
VA	Centers	2012	—	—	X	—
	Homes	2013	X	X	—	—
WA	Centers	2013	—	—	X	—
	Homes	2013	—	—	X	—
WV	Centers	2009	—	—	X	—
	Homes	2012	X	—	X	—
WI	Centers	2009	—	—	X	—
	Homes	2009	—	—	X	—
WY	Centers	2013	—	—	—	—
	Homes	2013	—	—	—	—
DC	Centers	2007	—	—	—	—
	Homes	2007	—	—	—	—
PR	Centers	1992	—	—	—	—
	Homes	1992	—	—	—	—
USVI	Centers	2011	—	—	—	—
	Homes	2011	—	—	—	—
GU	Centers	1997	—	—	—	—
	Homes	1997	—	—	—	—
DOD	Centers	1996	—	—	—	—
	Homes	1996	—	—	—	—

DOD, Department of Defense; GU, Guam; PR, Puerto Rico; USVI, United States Virgin Islands; —, indicates the absence of a regulation.

$\rho = 0.02$ ;  $P = .88$ ), but was positively correlated for homes (Spearman's  $\rho = 0.30$ ;  $P = .03$ ).

## DISCUSSION

In this review of state regulations targeting healthy sleep practices, we found

that states had few regulations consistent with IOM recommendations. No state had regulations for all 4 recommendations for centers or homes, and most states had only 1 or 2 regulations consistent with the 4 recommendations. When we examined geographic

variation, we found differences by census region for centers but not homes. States in the Northeast had the greatest number of regulations for centers, and states in the South had the fewest. It may be that centers are more tightly regulated by states and have more

**TABLE 2** State Regulations for Child Care Centers and Family Child Care Homes Updated in 2012 or 2013 and Consistent With Institute of Medicine Sleep Recommendations

Number of Regulations	States With Center Regulations	States With Home Regulations
0	IA, LS, MD, NE, SD, WY	CT, IA, NE, SD, WY
1	CO, CT, GA, KS, MT, NV, NC, ND, VA, WA	CO, GA, KS, MD, MT, NV, NC, WA
2	NM, TX, UT	NM, ND, TX, UT, VA, WV

regulations in general, compared with homes. Therefore, they may be more likely to cluster by geographic region, with center regulations more similar among neighboring states. In our previous study examining state child care regulations related to healthy infant feeding practices, we did not observe geographic differences in the number of state regulations for centers or homes.<sup>37</sup> Additionally, the number of state regulations was not correlated with the year of last update, but in that study we were not comparing regulations to recently released recommendations.<sup>37</sup> In the current study, we found that states that had updated their regulations after the IOM recommendations were released had more regulations consistent with the recommendations for homes, but not for centers. This suggests that the IOM recommendations may have prompted new regulations, although we were not able to assess the extent to which the IOM report influenced policy decisions within states and therefore cannot draw any firm conclusions.

We also found that no state had a regulation consistent with the recommendation to seek consultation yearly from a sleep expert, except in the context of SIDS prevention. Although consultation may be beneficial, the logistical limitations associated with the implementation of this recommendation raise concerns. If states were to mandate consultation on healthy sleep durations and practices, it would certainly increase the need for sleep experts. But without additional resources and further training of health professionals, this need may largely go unmet.

There are other important factors to consider related to sleep and obesity. First, although the majority of child care takes place during the day,<sup>30,31</sup> much of the research examining sleep and obesity combined daytime and nighttime sleep to compute total duration. A few studies considered nighttime sleep exclusively and found an increased risk for obesity or obesity-related behaviors,<sup>20,38</sup> and some have reported that daytime sleep had little influence on the relationship between nighttime sleep and obesity.<sup>20,21,39</sup> However, 1 previous study found that daytime naps helped protect against obesity.<sup>40</sup> There is some evidence that daytime naps do not substitute for nighttime sleep in the prevention of obesity,<sup>20</sup> and that children who nap during child care may sleep fewer hours at night.<sup>41</sup> This may be especially important for parents whose children sleep for long durations during the day in child care. Future studies should explore the extent to which daytime naps contribute to the prevention of obesity when considering total daily sleep duration, as this information will have important implications for recommendations related to sleep in child care.

Second, although a number of studies found a relationship between sleep and obesity, researchers defined short sleep duration differently. In fact, 2 recent systematic reviews examined sleep duration and weight gain, and neither explored differences in researcher definitions of insufficient sleep. Without a widely accepted definition of short sleep duration, it is challenging to fully evaluate the relationship between sleep and obesity in children. This lack of consistency has prompted recent calls for additional

research in this area, especially for studies identifying ideal sleep durations in childhood.<sup>34,42</sup> As a result, some researchers have explored sleep duration norms in children and provide reference data to inform guidelines.<sup>43,44</sup> Recent recommendations put forth by the National Sleep Foundation provide additional guidance on appropriate sleep durations for young children.<sup>45</sup> However, these durations are not specifically linked to the prevention of obesity, and individual needs may vary. These guidelines range from 10.5 to 18 hours of sleep within a 24-hour period for infants, to 11 to 13 hours within a 24-hour period for preschoolers.<sup>45</sup> The IOM recommendations encourage adherence to these sleep duration guidelines, but future research should evaluate whether these durations are protective against obesity.

Finally, it is important to recognize that daytime sleep in child care may be a point of contention between parents and providers. If providers encourage longer naps during the day, these may, in turn, influence children's nighttime sleep duration. Previous studies have found that child care attendance was associated with shorter nighttime sleep duration for infants,<sup>24</sup> and that daytime sleep in child care decreased nighttime sleep at home for preschoolers.<sup>41</sup> Future sleep recommendations targeting child care settings should consider the relationship between parents and providers, as well as the extent to which daytime naps affect nighttime sleep duration.

Although previous studies have compared state regulations to national standards, including those related to obesity<sup>46</sup> and SIDS prevention,<sup>47,48</sup> this current review is the first to consider sleep regulations as a means of preventing obesity in young children. The previous study examining regulations related to obesity prevention focused on dietary and physical activity behaviors in child care. When comparing our review results to that previous review,

Tennessee was the only state among those with the highest number of regulations for centers in both studies. For homes, states with the highest number of regulations in both reviews were Oregon, Texas, Vermont, and West Virginia. Previous studies have examined sleep regulations to help prevent SIDS before and after the Back to Sleep campaign (now Safe to Sleep),<sup>49</sup> but these reviews were conducted in 2000 and 2005, making comparisons less meaningful; the majority of states have since updated their regulations.<sup>47,48</sup> Future studies could explore the extent to which states had both regulations promoting healthy sleep practices for obesity prevention and regulations that encouraged behaviors to help prevent SIDS.

Despite the usefulness of regulatory reviews, at any given time a number of states are in the process of making changes to their regulations. Thus, this

review is current as of 2013. However, results provide important information about regulations at the time of the review, and could serve as a baseline to assess future regulatory changes. Additionally, although regulations are compulsory, they do not necessarily indicate actual practice. Future studies should assess the extent to which actual practices, such as sleep-promoting behaviors in child care, are consistent with state regulations.

## CONCLUSIONS

Evidence on the importance of sleep for obesity prevention continues to accumulate. Insufficient sleep durations in early childhood have been linked to obesity in later childhood and adolescence,<sup>18,23,40,50,51</sup> emphasizing the need for early intervention. Because the majority of young children spend time in child care outside of the home, these facilities have become targets for

obesity prevention.<sup>32,33</sup> In this review, few states had regulations related to healthy sleep practices consistent with the IOM recommendations. Results suggest that states that had updated their regulations after the IOM report was released had more regulations consistent with the recommendations. The report provides an important first step toward increasing awareness of sleep practices in child care. However, as new research emerges, these policy-based recommendations should be refined to reflect best practices. As recommendations evolve, it will be important to assess the extent to which states revise their regulations to be consistent with new recommendations. Additionally, public health and early childhood professionals should assist states with the adoption of regulations consistent with evidence-based recommendations for healthy sleep practices in child care.

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## Regulations to Promote Healthy Sleep Practices in Child Care

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