Too Weighty a Link Between Short Sleep and Obesity?

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PAPERS[1,2] IN RECENT ISSUES OF *SLEEP* ADD TO OTHER EPIDEMIOLOGICAL EVIDENCE FROM ADULTS[3,4] AND CHILDREN[5-7] POINTING TO OBESITY AND RELATED effects (e.g., metabolic syndrome, type 2 diabetes) being associated with habitually short or long sleep. The link is not necessarily through sleepiness, indolence, and less inclination towards exercise via insufficient or poor quality lengthy sleep (e.g., OSA). Instead, it could be caused by energy-balance impairments via insulin resistance/glucose intolerance and changes to leptin and ghrelin levels.[8]

However, any weight or BMI differences between short, normal, and long sleepers only seem apparent after many years of sleeping in this manner. For example, a BMI difference of 2.5 units (about 7 kg) between otherwise comparable short (5 h) and normal (7-8 h) sleepers,[2] developed slowly or at some point during 10 years of this sleep; that is, with some hundreds, maybe thousands of hours accumulated difference in the daily sleep between the two groups over this 10 y period. This point becomes more evident with the very small, highly statistically significant 1 BMI unit difference involving 1469 women, 32-62 years of age, sleeping either more or les than 6 h per day.[4] Or, the significant 0.9 kg difference in weight gain between 5-h and 8-h sleepers, in a sample of 68,183 women, appearing over a 10 y period.[3]

Even if this key point is excluded, the risk of obesity only becomes apparent when habitual sleep is unusually short, around 5 h/day in adults[2,3] (and below about 10 h/day in children[5,6]), or very long, usually >9 h in adults. Although acute 4 h/day sleep restriction[8] produces glucose intolerance and incipient metabolic syndrome, such a low amount of sleep cannot be sustained for more than a few days, owing to excessive daytime sleepiness, and is beyond tolerable "everyday" conditions. Even 5 h daily sleep is atypical, found in only a minority (5%-8%) of the adult population. In these respects, there is little epidemiological evidence showing that 6-h sleepers are at real risk and that, for adults, about 7 h uninterrupted sleep seems quite "safe."[9] Relatively few obese adults/children are short sleepers, and few short sleeping adults/children are obese or suffer obesity-related disorders.[9]

Perhaps, if short sleeping obese people slept for longer, there would be less energy imbalance, hormonal levels would normalize, they would be more alert, less hungry, more active—maybe hypnotics could be therapeutic for obesity? Alternatively, this extra sleep time might be better spent in physical exercise and in reducing energy input, as there is little evidence[9] showing that by lengthening sleep alone, short sleepers will lose weight. Besides, there may be as many underweight as there are overweight short sleepers; but we know less about this other end of the BMI distribution.

Whilst, for children, the prevalence of obesity in those habitually sleeping <10 h is more than double that for those sleeping >10 h[5] or 10.5 h,[6] this has to be seen in perspective. In one study,[5] 7.7% of obese children slept ≤10 h, compared with only 3.6% of non-obese controls sleeping ≤10 h. Put differently, 92.3% of these obese children were not short sleepers; that is, they slept beyond 10 h. Taking this latter viewpoint with another prospective study[6] indicating increased obesity in shorter sleepers, 89.7% of those short sleeping children who slept ≤10.5 h when aged 3 y did not become obese four years later. This compares with 93.6% and 93.2% "non-obesity" four years later, for those who originally slept 11-11.9 h and ≥12 h, respectively. The recent prospective study[7] of children aged 9 y, followed until 12 y, reported that whereas at 9 y the mean sleep durations for those who did or did not become overweight were similar, later, their respective sleep durations of 8.78 h and 9.02 h, when aged 12 y, were significantly different, but this was only by 14 minutes.

Many type 2 diabetics, irrespective of BMI, have disturbed sleep linked to other medical problems, including depression,[1] and seek better sleep. Improving this sleep, alone, (e.g., with hypnotics) is unlikely to relieve the metabolic syndrome or diabetes. Most habitual 6-h sleepers, having otherwise undisturbed sleep, will not develop diabetes as a result of this amount of sleep.[1,9] Although the diabetes risk for 5-h sleepers may be almost double[10] that of 7-h sleepers, it may require 10 y of sleeping like this, and still with 96% of these sleepers not developing diabetes, compared with a 97.5% symptom-free prevalence for 7-h sleepers.[10] Finally, the discerning and latest paper in *SLEEP*, by Gangwisch et al,[1] mostly involving older people, reported that 8.9% of them habitually slept < 5 h. A 8-10 y follow-up found a 4.8% incidence of diabetes in the entire sample of 8992 people. Under 5 h sleep was associated with eg: older age, higher BMI (this was 27, against 26.7 and 26.0 for 6-h and 7-h sleepers, respectively) and, importantly, depression (having a prevalence of 34% versus 13% for 7-h sleepers). When adjusted for these covariates, the significant odds ratio for < 5-h sleepers having diabetes was 1.47 (7 h sleep = 1.0); and for > 9 h sleep it was 1.52. Ratios for 6-h and 8-h sleepers were 1.08, and 1.09, respectively. In effect, by sleeping < 5 h a day apparently for

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8-10 y, less than four per 100 of these 5-h sleepers could attribute their diabetes to short sleep alone.

I use the important findings from these excellent papers only to illustrate that habitually short sleep itself, whether it be in adults or children causes, at best, only a relatively small weight gain when seen over many years. We do not know if the gain is sudden (then stabilizes), or gradually accumulates over the years, nevertheless, it is associated with a difference of what must be hundreds of hours of sleep if one compares habitual 5-h versus 7-h sleepers. Moreover, in these respects, there remains a gap in knowledge between the effects of acute, severe sleep restriction (e.g., down to 4 h sleep[8]) in normal sleepers, and those people habitually sleeping at the lower end of the normal distribution. The greater danger to health from inadequate sleep is not obesity and its consequences, but having an accident as a result of inadvertently falling asleep. For children, insufficient sleep causes behavioral and learning problems, which must be of greater concern. The solution to obesity lies not in sleep but in improving waking behaviors that encourage both exercise and contemplating the intake of fewer calories.

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