Sleep and Adolescent Obesity:

Results from the Creating Opportunities for Personal Empowerment (COPE) Randomized Controlled Trial

Diana Jacobson, Arizona State University
Stephanie Kelly, Arizona State University and Ohio State University
Bernadette Mazurek Melnyk, The Ohio State University

Funding Support: **NIH/The National Institute of Nursing Research--R01NR012171**

THE OHIO STATE UNIVERSITY COLLEGE OF NURSING

ASU College of Nursing & Health Innovation

Background and Significance

- Pediatric Obesity
  - 32% of US children and adolescents aged 2-19 are overweight or obese.
  - In Arizona, for children between 10-17 years: 50% of Hispanic children; 24% of white, non-Hispanic children; and 30% of Black, non-Hispanic children are overweight or obese.

Background and Significance

- Current school-based prevention interventions have demonstrated variable impact on weight outcomes.
- Those, like COPE, that combine physical activity, nutrition and cognitive/behavioral strategies have demonstrated efficacy.

Background and Significance

- SLEEP: Effects of Insufficient Sleep
  - Decreased concentration & impaired academic performance
  - Increased mood disorders, suicide ideation, hyperactivity & drug and alcohol use
  - Impaired motor skills
  - Decreased immune function
  - Increased injuries and accidents
  - **Increased risk of obesity**

Background and Significance

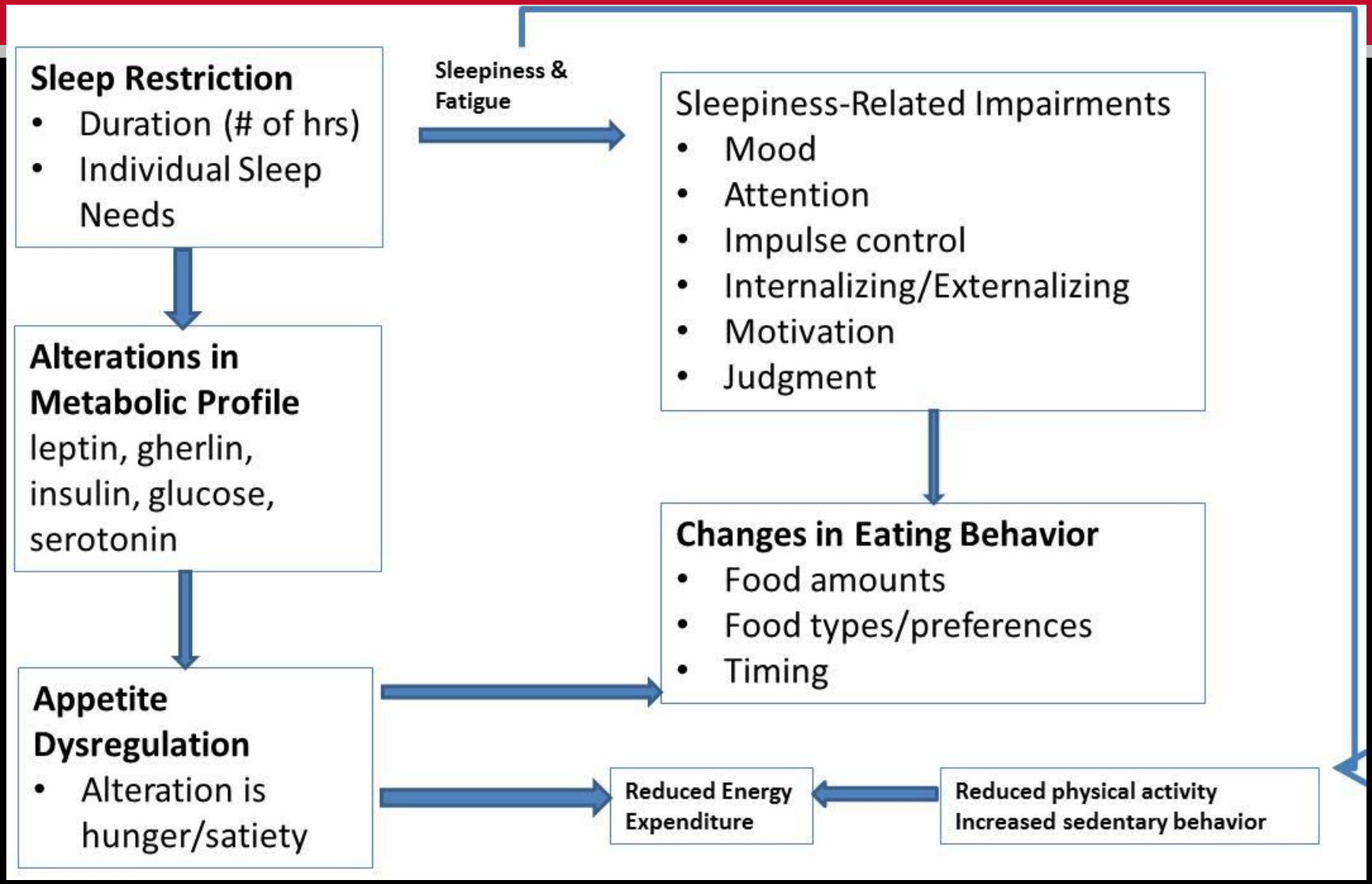
- **Sleep**
  - There is conflicting evidence that child and adolescent sleep duration has decreased.
  - The amount of sleep children need differs by child, age and biological functioning.

Sleep duration in adolescents has decreased	Sleep duration in adolescents has remained stable
Iglowstein et al. (2003)	Calamaro, C. J. (2010)
Dollman et al. (2007)	Williams, J. A. et al. (2013)
Matricciani, L. & Williams, M. (20ll)	

Background and Significance

- **Evidence to support link of decreased sleep duration and obesity**:
  - Leads to decreased leptin
  - Leads to increased ghrelin
  - Secretion of growth hormone, prolactin, cortisol, thyrotropin, and insulin are influenced by sleep.

Pathways to Risk (Hart et al., 2011)



Background and Significance

- **Inadequate Sleep and Psychiatric Symptoms:**
  - Sleep problems disproportionately present in many psychiatric conditions.
  - Direction of causation seems to be reciprocal rather than unidirectional.
  - ↑ deprivation predicts psychiatric symptom severity and functional impairment.

Purpose

- Analyze baseline findings related to:
  - Sleep
  - Gender
  - Weight

Methods

- Chi Square
- t-tests
- Frequencies
- Pearson's Correlations

Results

Teen Demographics (N=779)		
	Mean	**SD**
Age (years)	14.74	0.73
Body Mass Index	24.43	5.92
Body Mass Index Percentile	70.59	27.11

Results

Teen Demographics (N=779)			
		n	**%**
Gender	Female	402	51.6
	Male	377	48.4
Grade	9th grade	389	49.9
	10th grade	295	37.9
	11th grade	89	11.4
	12th grade	6	0.77
Race	Hispanic	526	67.5
	White	110	14.1
	Black	77	9.9
	Amer. Native	27	3.5

Results

Teen Demographics			
		n	**%**
BMI Categories	Underweight	14	1.8
	Normal weight	433	55.6
	Overweight	148	19.0
	Obese	182	23.4
Depression	Average	645	82.8
	Mildly	52	6.7
	Moderately	47	6.0
	Extremely	24	3.1
Anxiety	Average	597	76.6
	Mildly	81	10.4
	Moderately	58	7.4
	Extremely	29	3.7

Results

How many hours on average do you sleep at night?			
	n	**Mean (SD)**	**p**
Males	267	7.43 (1.36)	0.03
Females	249	7.16 (1.34)	
Underweight and Normal Weight	301	7.47 (1.30)	0.00
Overweight and Obese	213	7.05 (1.41)	

Results

Correlations between Sleep, Depression and Anxiety			
	Hours of Sleep at Night?	**Beck Depression T Score**	**Beck Anxiety T Score**
How many hours on average do you sleep at night?	1		
Baseline Beck Depression T Score	**-.314****	1	
Baseline Beck Anxiety T Score	**-.294****	**.776****	1
** Correlation is significant at the 0.01 level (2-tailed)			

Implications for Research & Practice

- Objective measurement of sleep with actigraphy in future intervention studies
- Multicomponent interventions should include sleep education/hygiene as well as physical activity and nutrition.
- Assessment of sleep patterns is necessary in all children who are overweight or obese.

Sleep Interventions

- **Educational Programs should include:**
  - The importance of sleep and its impact on cognitive functions and emotional regulation;
  - Signs of child/teen sleep deprivation;
  - Development of basic sleep processes and sleep regulation;
  - Environmental factors that affect sleep; and
  - Specific strategies to facilitate healthy sleep.

Conclusion

- Short sleep duration is associated with obesity and increased depressive and anxiety symptoms in adolescence.
- Comprehensive school-based healthy lifestyle interventions should include sleep education in addition to physical activity, nutrition and cognitive behavior skills building.

References

- Beebe, D. (2011). Cognitive, behavioral, and functional consequences of inadequate sleep in children and adolescents. *Pediatric Clinics of North America, 58*, 649.
- Blunden, S. L., Chapman, J., & Rigney, G. A. (2012). Are sleep education programs successful? The case for improved and consistent research efforts. *Sleep Medicine Reviews, 16*, 355-370.
- Brown, T., & Summerbell, C. (2009). Systematic review of school-based interventions that focus on changing dietary intake and physical activity levels to prevent childhood obesity: An update. *Obesity Reviews, 10*, 110.

References

- Cappuccio, F. P., Taggart, F. M., Kandala, N. B., et al. (2008). Meta-analysis of short sleep duration and obesity in children and adults. *Sleep, 31*, 619.
- CDC. (2010). Sleep and sleep disorders. CDC features website. Accessed June 14, 2014 at http://www.cdc.gov/features/sleep/
- Gruber, R., Cassoff, J., & Knauper, B. (2011). Sleep health education in pediatric community settings: rational and practical suggestions for incorporating health sleep education into pediatric practice. *Pediatric Clinics of North America, 58*, 735-754.

References

- Hart, C. N., Cairns, A., & Jelalian, E. (2011). Sleep and obesity in children and adolescents. *Pediatric Clinics of North America, 58*, 715-733.
- Mitchell, J. A., Rodriguez, D., Schmitz, K. H., & Audrain-McGovern, J. (2013). Sleep duration and adolescent obesity. *Pediatrics, 131*, e1428.
- Ogden, C. L., Carroll, M. D., & Kit, B. K. (2014). Prevalence of childhood and adult obesity in the US 2011-2012, *JAMA, 311*(8), 806-814.
- Patel, S. R., & Hu, F. B. (2008). Short sleep duration and weight gain: A systematic review. *Obesity, 16*, 643.

References

- Oude, L., Baur, H., Jansen, H. et al. (2009). Interventions for treating obesity in children. *Cochrane Database Systematic Reviews*, 1:CD001872.
- Short, M. A., Gradisar, M., Wright, H., Lack, L. C., Dohnt, H., & Carskadon, M. A. (2010). Time for bed: Parent-set bedtimes associated with improved sleep and daytime functioning in adolescents. Sleep, 34(6), 797-800.
- Williams, J. A., Zimmerman, F. J., & Bell, J. F. (2013). Norms and trends of sleep time among US children and adolescents. *JAMA, 167*(1), 55-60.

Contact Information

- Thank you!
- 谢谢

Diana Jacobson PhD, RN, PPCNP, PMHS

diana.jacobson@asu.edu

500 N. 3rd Street
Phoenix, Arizona 85284
United States