

Disparities in Energy Product Use, Sleep, and Health Outcomes

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Conflicts of Interest

• None.

Outline

- What are health disparities?
 - Why think of social/behavioral pathways?
- What are sleep disparities?
 - And why might they play a role in health?
 - And the possible role of energy drinks
- Social patterns of energy drink use
- Potential pathways linking energy drink use, sleep, and health disparities

Prevalence of metabolic syndrome



Beltran-Sanchez, Harhay, Harhay, and McElligott, 2013

Prevalence of hypertension



Egan, Zhao, and Axon, 2010

Cardiovascular death before age 75



Keenan and Shaw, 2011



Braveman, Cubbin, Egerter, Williams, and Pamuk, 2010

Why do these disparities exist?

- Genetic factors
- Gene-environment interactions
- Life course factors
- Social and behavioral factors

When we sleep, where we sleep, and with whom we sleep are all important markers or indicators of social status, privilege, and prevailing power relations.

-Simon J. Williams (2005)

What is the question?



Grandner, Ruiter-Petrov, Jackson, Rattanaumpawan, and Patel, In Press

Sleep duration and race/ethnicity



Adjusted for: age; age-squared; gender; marital status; education; family income; family size; employment status; stress level; smoking status; exercise participation; activity limitation; alcohol consumption; weight; number of bed-days per year; urban environment variables; residence type; and region Hale & Do, 2007

Sleep duration and race/ethnicity



Adjusted for: age, sex, marital status, immigrant status, language spoken at home, income, education, access to health insurance, home ownership, food security

Whinnery, Jackson, Rattanaumpawan, and Grandner, In Press

CRP: Stratified by race/ethnicity Overall (Model 2)



Grandner, Buxton, Sands, Pandey, Jackson, and Jean-Louis, 2013

Poverty, race/ethnicity, and sleep



Patel, Grandner, Xie, Branas, & Gooneratne, 2010

Sleep duration and income

Mean Family Income



Sleep duration and income



Stamatakis, Kaplan, & Roberts, 2007

Education



Education



<u>Adjusted for:</u> Age, Sex, Marital Status, Race/Ethnicity, Immigration, Language, Income, Insurance, Home Ownership, Food Insecurity, and Overall Health

Whinnery, Jackson, Rattanaumpawan, and Grandner, In Press

Food Security & Sleep Symptoms



Grandner, Ruiter-Petrov, Jackson, Rattanaumpawan, and Patel, In Press

Food Security & Sleep Duration



Whinnery, Jackson, Rattanaumpawan, and Grandner, In Press

Childhood SES and poor sleep



Childhood SES = parental education. Adjusted for age, gender, BMI and race (black/white).

Tomfohr, Ancoli-Israel & Dimsdale, 2011

Sleep and health disparities

Group	Sleep Duration	5-year ∆SBP			5-year ∆DBP		
		Not adjusted for sleep duration	Adjusted for sleep duration	% Effect Change	Not adjusted for sleep duration	Adjusted for sleep duration	% Effect Change
Black Men	5.2 (1.1)	+4.45	+2.87	-36	+2.70	+0.43	-84
Black Women	5.9 (0.8)	+1.25	+0.36	NA	+3.48	+2.20	-37
White Men	6.1 (0.9)	+2.85	+2.26	-21	-0.36	-1.22	NA
White Women	6.7 (0.8)	Reference			Reference		

Knutson, Van Cauter, Rathouz, Yan, Hulley, Liu, and Lauderdale 2007



Why would SES patterns exist?

- Energy drinks can be purchased with EBT/SNAP
 - Sugary drinks account for 48-58% of beverage budget (Andreyava et al., 2012)
- Energy drink use associated with overall energydense dietary pattern positively associated with poverty (Park et al., 2011)
- Adjusted OR for caffeine use in shift workers is 3.29 (Walia et al., 2012)

Why would racial patterns exist?

- Energy drink ads are targeted to minorities in 2010
 - Black children saw 161% more ads than white children
 - Especially 5-hour energy (2.70:1) and Red Bull (2.52:1)
 - Black teens saw 106% more ads than white teens
 - Especially 5-hour energy (2.14:1) and Red Bull (1.83:1)
 - Of only 8 sugary drink brands advertised on Spanish language TV, two were 5-Hour Energy and Red Bull
 - Fewer ads for sugary drinks overall on Spanish-language radio but 22% more ads for energy drinks

Even if patterns are not seen, they may eventually emerge.

Patterns of use

- Data on social patterning of energy drinks use is scarce
- However, there are a few very clear patterns:
 - This is an emerging phenomenon
 - Common in adolescents, less in adults (age is strongest predictor)
 - More use in men
 - Commonly used in the context of alcohol
 - Unlike other caffeinated drinks
- And there are many unclear patterns
 - Patterns of use by race/ethnicity and socioeconomic status?

Toblin, Clarke-Walper, Kok, and Sipos, 2012

When do adolescents start?

- Study of middle schoolers in Italy
 - Use generally starts in middle school
 - 17.8% in 6th grade
 - 56.2% in 8th grade
 - Frequent use in boys (>1/week)
 - 6.2% in 6th grade
 - 16.5% in 8th grade
 - Predictors were smoking and alcohol use

Gallimberti, Buja, Chindamo, Vinelli, Lazzarin, Terraneo, Scafato, and Baldo, 2013

Socioeconomic patterns

- Studying alcohol use patterns in Brazilian college students
 - Frequency of use of energy drinks mixed with alcohol varied by SES category



Locatelli, Sanchez, Opaleye, Carlini, and Noto, 2012

Socioeconomic patterns?

- Study of college students in Puerto Rico
- More common in younger students – (26.3% in age 21-30 vs 9.4% in 31-53)
- More common in men
 - (35.6% vs 18.9%)
- No differences by SES

Rios, Betancourt, Pagan, Fabian, Cruz, Gonzalez, Gonzalez, Rivera-Soto, and Palacios, 2013

Socioeconomic patterns?

- Random sample of the population of Milwaulkee, WI
- Energy drink use more common in men (OR=3.74)
- Energy drink use more common in young
 - OR=8.83 in 18-29 vs 55+
 - OR=3.55 in 30-54 vs 55+
- No differences according to education level
- No differences according to employment status
- No differences according to reported household income
- Energy drink use more common in city vs surrounding area (OR=1.99)
- Some differences according to race
 - No difference in Black vs White
 - "Other" more likely than White (OR=2.26)
 - 45% White, 37% Black 12% Hispanic, 3% Asian, 3% Multiracial Berger, Fendrich, Chen, Arria and Cisler, 2011

Socioeconomic patterns?

- Data from 2010 NHIS on "Sports and Energy Drinks"
 - Nationally-representative sample
 - Includes Gatorade, VitaminWater, etc.



Berger, Fendrich, Chen, Arria and Cisler, 2011

Race/Ethnicity patterns?

- Data from 2010 NHIS on "Sports and Energy Drinks"
 - Nationally-representative sample
 - Includes Gatorade, VitaminWater, etc.



Berger, Fendrich, Chen, Arria and Cisler, 2011

Energy products: NHANES 2007-2010



Regan Bailey, from yesterday

Demgraphic predictors (NYC)

- More common in men (36.9% vs 29.8%)
 - Also more likely to combine with alcohol (19.6% vs 14.3%)



Implications

Are there differences in energy drink (and supplement) use?

• How might patterns of energy drink use be related to differential experiences of sleep?

• How might patterns of energy drink use play a role in sleep disparities?



Energy drinks and risky behavior

- In all subjects
 - Serious physical fight
 - Seatbelt omission
 - Risk on dare
- In White only
 - Cigarette use
 - Alcohol use
 - Alcohol problems
 - Prescription drug use



Role of sleep duration



Kozak, Paer, Jackson, Chakravorty, and Grandner, 2011

Energy shots and blood pressure

• Newer, high-caffeine energy shots associated with short-term increases in blood pressure



Figure 1. Mean \pm SE changes in systolic blood pressure (SBP) between the caffeinated arm and the decaffeinated arm at 1, 3, and 5 hours after energy shot consumption compared with baseline values.



Figure 2. Mean \pm SE changes in diastolic blood pressure (DBP) between the caffeinated arm and the decaffeinated arm at 1, 3, and 5 hours after energy shot consumption compared with baseline values.

Sleep attitudes

- Black/white differences in the following (among older women):
 - I am motivated to make sure that I have enough time to sleep
 - My sleep is important to my health
 - Boredom makes you sleep even if you slept enough the night before
 - Lying in bed with your eyes shut is as good as sleeping
 - Opening the car window is a good way to wake me up if I am drowsy while driving
 - Turning up the volume of the radio or music is a good way to wake me up if I am drowsy while driving
 - Getting enough sleep is important for me to be able to enjoy the daytime
 - People who fall asleep at work or at school are lazy or have bad habits*
 - Not enough sleep can lead to serious consequences*
 - Poor sleep affects the quality of my life*
 - Dozing while driving a vehicle is serious

Drowsy Driving



Maia, Grandner, Findley, and Gurubhagavatula et al., In Press

Other pathways

• Differential genetic risk

- Example: CYP1A2 gene important in caffeine metabolism, associated with race/ethnicity (Gines and Dahl, 2008)
- Differential blood glucose effects
 - Example: adding caffeine to sugary drinks alters glucose metabolism profile (Keast et al., 2011)

Moderating effect of culture

 Endorsement of traditional masculinity and conforming to masculine norms predict energy drinks (Wimer & Levant, 2013)

Many social/behavioral questions

- What are the sociodemographic and socioeconomic patterns of energy product use?
 - Relative to coffee?
 - And what could they be a proxy for?
- What is the role in the growth of energy drink use in beliefs and attitudes about healthy sleep?
 - Are people trying to replace sleep?
 - Are there better alternatives?
 - How can we improve sleep beliefs and practices in the general population?

Many social/behavioral questions

- Are there certain groups that are at particular risk to the effects of energy drinks?
 - Genetic and physiologic moderators of risk?
 - Social/demographic moderators of risk?

- What are the harmful effects of energy products in how (and in whom) they are used?
 - What are the cognitive and functional outcomes?
 - Do these change across the life course?
 - Are there issues being masked (e.g., shift work)?

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