Energy drink use and high-risk behaviors: Research evidence and knowledge gaps

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Overview

2. Neurodevelopmental Context of Risk-taking Behavior during Adolescence
3. Energy Drink Use: Potential Exacerbation of Health-risk Behaviors
4. Relationship between Energy Drink Use and Alcohol Dependence in College Students
5. Prospective Relationship between Energy Drink Use and Subsequent Prescription Drug Abuse
6. Critical Knowledge Gaps
"Until quite recently, it was generally believed that the majority of brain development is finished by the age of 10. It has become clear that during the adolescent years, the organization and functioning of the brain go through complex changes."

Aaron White, Ph.D.

During the second decade of life:

- The neurologic “pruning process” unfolds, which ultimately leads to more focused and efficient processing by the adult years.
- The parietal, temporal and occipital lobes all undergo unique changes.
- Emotional areas of the brain reach full operating power by mid-adolescence at a time when the frontal lobes are still in flux, giving rise to emotion-driven rather than methodical decision-making.
- Gray-matter volume increases during adolescence and into the early 20s.
- White matter volumes increase linearly into young adulthood.
**Understanding Risk-taking from a Neurodevelopmental Perspective**

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- White matter volumes increase linearly into young adulthood.

- Increases in risk-taking without regard for possible consequences
- Increased susceptibility to rewarding properties of substances
- Use during adolescence increases the risk of addiction in adulthood

**References**

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Kuhn, 2006  
Pharo, Sim, & Graham, 2011  
Spear, 2013  
Steinberg, 2008  
Sturman & Mogghaddam, 2011  
White, 2009
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Study #1: Energy Drink Use and Alcohol Dependence

Baseline Characteristics (n=975)

- Sex
- Race/Ethnicity
- Socioeconomic Status
- Fraternity/Sorority Involvement
- Sensation-Seeking
- Use of Other Caffeine Products
- Alcohol Consumption
- Age of First Intoxication
- Early Conduct Problems
- Depression Symptoms
- Family History

Frequency of Energy Drink Use

Alcohol dependence and other alcohol-related problems

Frequency of energy drink consumption among CLS sample (n=1,097)

None (0 times): 34.5%
Occasional (1-11 times): 25.0%
Monthly (12-51 times): 27.6%
Weekly (52-155 times): 10.4%
Daily or Almost Daily (156-370 times): 2.6%

All energy drink consumers (65.6%)
“Low-frequency” consumers (52.6%)
“High-frequency” consumers (13.0%)

Mean frequency:
- None: 0 times
- Occasional: 4.7 times
- Monthly: 25.9 times
- Weekly: 86.6 times
- Daily or Almost Daily: 225.4 times
Comparison of Energy Drink Users and Non-users on Alcohol Dependence Items and other Alcohol-related Problems

![Graph showing comparison of energy drink users and non-users on alcohol dependence items and other alcohol-related problems.]

### Energy Drink Consumption

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<th>AOR</th>
<th>p</th>
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<td>High Frequency vs. None</td>
<td>2.40</td>
<td>.007</td>
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<tr>
<td>High Frequency vs. Low Frequency</td>
<td>1.86</td>
<td>.020</td>
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<td>Low Frequency vs. None</td>
<td>1.29</td>
<td>.328</td>
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Study #2: Energy Drink Use and Subsequent Use of Other Drugs

Baseline Characteristics (n=965)
- Sex
- Race/Ethnicity
- Socioeconomic Status
- Sensation-Seeking
- Other caffeine use

Energy Drink Use in Year 2
23% of sample

Incident (New) Use of Other Drugs In Year 3
- Tobacco
- Marijuana
- Hallucinogens
- Cocaine
- Nonmedical Prescription Stimulants,
  - Analgesics, &
  - Tranquilizers
- Ecstasy

Energy Drink Use and Subsequent Use of Other Drugs

Baseline Characteristics (n=965)
- Sex
- Race/Ethnicity
- Socioeconomic Status
- Sensation-Seeking
- Other caffeine use

Energy Drink Use in Year 2

Incident (New) Use of Other Drugs in Year 3
- Frequency of Tobacco Use
- Marijuana
- Hallucinogens
- Cocaine
- Nonmedical Use of Stimulants, Analgesics
  - Tranquilizers
  - Ecstasy

Energy drink users in Year 2 were significantly more likely than non-users to become new users of nonmedical prescription stimulants and analgesics, even after statistical adjustment for demographics, sensation-seeking and other types of caffeine use.
Summary of Prospective Results

- Tobacco: Energy Drink Users 13.9%, Non-users 9.4%
- Marijuana: Energy Drink Users 12%, Non-users 10%
- Hallucinogens: Energy Drink Users 5.1%, Non-users 2.9%
- Cocaine: Energy Drink Users 6.7%, Non-users 6.2%
- Nonmedical Rx Stimulants: Energy Drink Users 18.8%, Non-users 8.2%
- Nonmedical Rx Analgesics: Energy Drink Users 8.5%, Non-users 4%
- Nonmedical Rx Tranquilizers: Energy Drink Users 4.4%, Non-users 6%
- Ecstasy: Energy Drink Users 3.6%, Non-users 3.2%

AOR: 2.05; p<.001
AOR: 1.46; p<0.05
Summary of Knowledge Gaps

• More research is needed to characterize energy drink use patterns (e.g., acute, chronic) and the contexts in which they are used (e.g., sports, driving, academics, social settings, etc.)

• Little is known about the safety of energy drink consumption on the developing human brain through the mid-20s.

• Evidence supports that energy drink consumption might compound the natural tendency to engage in health-risk taking, but more research is needed to explain possible mechanisms.

• More prospective studies are needed to investigate the relationship between energy drink use with alcohol, tobacco, illicit and nonmedical prescription drug use, particularly when energy drink use begins in adolescence.
Summary of Knowledge Gaps

- More research is needed regarding the dose-dependency of these associations, and the acute and long-term impact of various patterns of consumption (e.g., heavy acute vs. chronic, etc.) on risk-taking behavior and health in general.

- Little research has been conducted to understand energy use patterns among high-risk populations, such as young individuals with cardiovascular abnormalities.

- Little is known of the safety of the concomitant consumption of energy drinks and other medications and illicit substances used by adolescents and young adults.


References


