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Received Date : 08-Aug-2015

Revised Date : 23-Oct-2015

Accepted Date : 24-Oct-2015

Article type : Commentary

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Alcoholism: Clinical and Experimental Research

Commentary

A Call for Research on High-Intensity Alcohol Use

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Consuming a large amount of alcohol in a single sitting poses acute risks (e.g., impaired driving, injury, memory blackouts, alcohol poisoning) and long-term risks (e.g., alterations to the developing brain, disease, development of alcohol use disorders; National Institute on Alcohol Abuse and Alcoholism, 2015). Research regarding very high quantities of alcohol consumption by youth in the U.S. is an emerging area of research (e.g., Patrick et al., 2013) and a high public health priority (Hingson and White, 2013). The goal of this commentary is to highlight potential next steps for research on high-intensity alcohol use.

Binge Drinking

To date, the majority of research on high levels of alcohol use has examined “binge drinking,” “heavy episodic drinking,” or “risky single occasion drinking,” each of which is generally defined as consuming five or more drinks. The 5+ threshold has proven incredibly valuable and has led to an accumulation of scientific knowledge about alcohol use, including

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/acer.12945](https://doi.org/10.1111/acer.12945)

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28 that binge drinking is an important indicator of individuals at risk for alcohol use disorder and is
29 associated with myriad negative consequences (Saha et al., 2007; Wechsler et al., 1994;
30 Wechsler and Nelson, 2008). Since 2004, the National Institute on Alcohol Abuse and
31 Alcoholism has defined binge drinking as four or more drinks for women and five or more drinks
32 for men in a period of two hours, because this level of alcohol use typically raises blood alcohol
33 concentration (BAC) to .08 g/dL (National Institute on Alcohol Abuse and Alcoholism, 2015).

34 The inclusion of measures of 5+ drinking across studies has provided substantial
35 information on individuals at risk for consequences, and these measures continue to be
36 valuable. However, a greater understanding of drinking at higher quantities is also needed. As
37 others have noted (e.g., Alexander and Bowen, 2004; Jackson, 2008), the empirical basis for
38 the standard 5+ measure is not as strong as may be assumed from its proliferation. Depending
39 on an individual's weight, alcohol tolerance, and situational conditions like food intake and
40 hydration prior to drinking, some 5+ binge drinkers may have relatively low (and potentially legal
41 for those aged 21 and older) blood alcohol concentrations. Using the single threshold of 5+
42 alcohol use, without additional measures of higher-quantity drinking, obscures very high risk
43 drinking. That is, it fails to differentiate those who are most at risk for serious acute
44 consequences due to intoxication far surpassing the legal limit.

45 **Drinking Beyond a Binge**

46 Given that serious acute consequences of alcohol use (e.g., alcohol poisoning,
47 blackouts) are exponentially more likely after consuming large amounts of alcohol, identifying
48 individuals at the highest levels of use is valuable for public health and safety. Failing to
49 examine higher levels of alcohol use—e.g., twice or three times as much alcohol as the
50 traditional 5-drink cutoff (Hingson and White, 2013; Patrick et al., 2013)—and their predictors
51 and correlates leaves a gap in our knowledge and understanding of alcohol epidemiology and
52 etiology. These higher cut-offs seem to be associated with meaningful differences. For example,
53 young adults consuming 15+ drinks reported more driving after drinking than those consuming
54 10-14 drinks or 5-9 drinks, and they were also more likely to drink again after experiencing
55 significant negative consequences such as alcohol-related arrest (Hingson and White, 2013).
56 These data reflect the increased risks for individuals and their communities that accompany
57 high-intensity alcohol consumption, and suggest that those who are drinking at the highest
58 quantities are most likely to be at risk for acute consequences and possibly for long-term
59 addiction and disorder.

60 Research has begun to examine alcohol use that surpasses the 5-drink binge criterion,
61 with several studies documenting that adolescents and young adults commonly drink well

62 beyond it. For example, 18- to 24-year-olds in the U.S. reported drinking an average of 9.5
63 drinks per binge drinking episode (Naimi et al., 2010). In the national Monitoring the Future
64 (MTF) sample, 10.5% of U.S. 12th-grade high school students reported consuming 10 or more
65 drinks in a row at least once in the past two weeks, and 5.6% reported consuming 15 or more
66 drinks in a row (Patrick et al., 2013). According to Wave II data on maximum drinks from the
67 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), 13% of 18- to 20-
68 year-olds drank 15+ drinks in the past year and 3% did so every two weeks (Hingson and
69 White, 2013).

70 In addition to these more general studies, a research literature on event-specific high-
71 risk drinking among college students has documented very high levels of alcohol use associated
72 with events such as 21st birthdays, Spring Break, sporting events, and holidays (e.g., Neighbors
73 et al., 2007; Rutledge et al., 2008). These studies have shown that very high quantities of
74 alcohol use are consumed in conjunction with specific celebrations, and raise further questions
75 about the extent to which this behavior typically occurs (e.g., on an average weekend). Thus far,
76 the majority of research on drinking that surpasses the 5+ cut-off is among college students
77 (e.g., White et al., 2006), leaving unanswered questions about potential similarities to and
78 differences from young adults who are not in full-time 4-year college.

79 **Measurement**

80 The validity of self-reported alcohol consumption is an ongoing area of research and has
81 been a concern of alcohol researchers for decades. In general, it has been determined that self-
82 report methods offer a reliable and valid method for collecting information on alcohol use (Del
83 Boca and Darkes, 2003; Simons, Wills, Emery, & Marks, 2015). However, at very high levels of
84 use the ability to self-report may be compromised. There is evidence that when young adults
85 consume 8+ drinks (based on observer reports) they may be more likely to underestimate their
86 alcohol consumption in self-reports (Northcote and Livingston, 2011). These discrepancies in
87 self-reported drinks at very high quantities of alcohol use may be the result of some combination
88 of intoxication interfering with memory and an effort to provide a more socially acceptable
89 response (Northcote and Livingston, 2011). Furthermore, research suggests that there is an
90 overall underreporting of alcohol use due to incorrect estimations of what comprises a standard
91 drink. In particular, people estimate that “a drink” is a larger quantity of alcohol than researchers
92 intend (White et al., 2005). Therefore, the reported prevalence of any threshold of drinking—
93 including 5+, 10+, and 15+ drinks—may be an underestimation of the actual behavior in the
94 population. The extent to which people can accurately self-report very high levels of alcohol use
95 requires additional research (Del Boca and Darkes, 2003).

96 **New Terminology**

97 Many researchers (myself included) who have examined very high levels of alcohol use
98 have struggled with the scientific terminology to describe this behavior. We have previously
99 used language such as “extreme binge drinking” (Patrick et al., 2013). However, there are
100 drawbacks to the “extreme” language, including that it sounds enticing and exciting (à la
101 extreme sports). Therefore, the term “high-intensity drinking” seems more appropriate and is
102 consistent with language already used by some scholars to describe alcohol use that is beyond
103 the 5-drink threshold (Byrnes et al., 2013; Koob, 2015; Naimi et al., 2010). A research
104 consensus regarding exactly how many drinks would qualify as high-intensity drinking is
105 needed, although twice the typical binge-drinking threshold (i.e., 10+ drinks) or twice the typical
106 gender-specific binge-drinking threshold (i.e., 8+ for women, 10+ for men) seem to be a
107 reasonable place to start (e.g., Byrnes et al., 2013; Patrick et al., 2013; White et al., 2006).

108 **Next Steps for Research on High-Intensity Drinking**

109 The time to expand our definitions and understanding of high-intensity drinking has
110 come. Even though we have seen historical decreases in alcohol use (Johnston et al., 2015),
111 we have not seen decreases in hospitalizations associated with alcohol overdoses (White et al.,
112 2011). This may be due to the fact that high-intensity drinking has not decreased in the same
113 way that 5+ binge drinking has decreased in recent years (Patrick et al., 2013). Research on
114 “extreme binge drinking” is now solicited by the National Institute on Alcohol Abuse and
115 Alcoholism (NIAAA) through requests for grant applications (e.g.,
116 <http://grants.nih.gov/grants/guide/pa-files/PA-14-190.html>). Additional calls for research on the
117 intensity of drinking have been made by NIAAA Director Koob (Koob, 2015), among others
118 (Naimi et al., 2010). This emerging research area has the potential to shed light on high-
119 intensity drinking with critical public health impact. Additional research is needed to answer
120 remaining questions about high-intensity drinking and individuals who report it. In particular, I
121 suggest that important questions remain regarding high-intensity drinking and (1) the
122 characteristics of people and situations associated with it, (2) its normative developmental
123 changes, (3) behavior within and outside of the college environment, (4) associations with
124 alcohol use disorders and other severe consequences, (5) how to prevent it, and (6) related
125 measurement issues.

126 First, we need information about the characteristics of people and situations that
127 increase the likelihood of high-intensity drinking. People may be more likely to report high-
128 intensity drinking based on sociodemographic factors (Patrick et al., 2013), for example, and
129 additional research evidence is needed to identify these risk factors. Understanding how

130 motivations for alcohol use and intentions to drink and get drunk may contribute to high-intensity
131 drinking could be keys to identifying salient points for intervention. Certain situations may also
132 facilitate high-intensity drinking, such as celebratory events (Neighbors et al., 2007; Rutledge et
133 al., 2008) and drinking contexts (e.g., where bar specials or free drinks are offered). Each of
134 these predictors suggests potential intervention targets and mechanisms, and this basic
135 understanding of high-intensity drinking is a critical first step.

136 Second, we currently know very little about normative changes in high-intensity drinking
137 across age. The typical developmental course of 5+ drinking (with a peak around age 20 or 21)
138 may or may not apply to high-intensity drinking. Identifying what age groups are most likely to
139 drink to very high levels and what types of developmental patterns may indicate particular risk
140 for acute and long-term negative consequences will provide information for clinicians, and point
141 to potential sensitive periods for intervention.

142 Third, we need to understand high-intensity drinking both within the university culture
143 and outside of the college context. A large proportion of the research on high-intensity drinking
144 thus far has focused on college students, and this focus is warranted given that the university
145 context is associated with unique risks for alcohol use. However, it is important to understand
146 alcohol use patterns in the entire population, including young adults who are not enrolled in full-
147 time 4-year college.

148 Fourth, the extent to which there is a link between high-intensity drinking and alcohol use
149 disorder and other severe alcohol problems should be empirically documented. A single
150 threshold of any level may not be sufficient to identify those at risk; additional research is
151 needed to clarify higher-intensity thresholds that pose risks for different alcohol consequences
152 (e.g., Jackson, 2008; Read et al., 2008). Data regarding typical and peak drinking quantities will
153 be useful here, and are available from existing datasets including NESARC and the National
154 Survey on Drug Use and Health (NSDUH). In some cases, the 5+ threshold may continue to be
155 the best indicator and in others a higher threshold may be a better predictor. For example,
156 whether measures of high-intensity drinking (e.g., 10+ drinks) provide a more effective
157 screening tool for individuals in need of alcohol treatment than lower drinking thresholds has
158 important implications for intervention.

159 Fifth, a key goal should be effective prevention and intervention for high-intensity
160 drinking. We need to document whether existing strategies that are effective for binge drinking
161 also affect high-intensity drinking, or whether new strategies are needed to reduce this behavior
162 and mitigate its negative consequences. Routinely including indicators of high-intensity drinking
163 in prevention trials would help build our collective knowledge (Hingson and White, 2013).

164 Sixth, it will be important to document whether self-report data of high-intensity drinking
165 is valid and reliable. Questions regarding whether people can accurately estimate how many
166 standard drinks they consumed, remember the number after the drinking episode (even if they
167 were highly intoxicated), and report it in a survey context require empirical examination.

168 To accomplish all of these goals, researchers should consider including questions
169 regarding maximum number of drinks consumed or high-intensity thresholds (e.g., 10+ drinks or
170 8+/10+ drinks for women/men) in existing studies, as well as designing new studies specific to
171 high-intensity alcohol use. We should also take advantage of existing national data regarding
172 high-intensity drinking. For example, MTF has included measures of frequency of consuming
173 10+ and 15+ drinks in a row in the past two weeks among annual cross-sectional samples of
174 12th graders and among longitudinal samples of individuals aged 18 to 30 since 2005, and the
175 NESARC Wave III data collection in 2012-2013 among adults in the U.S. included questions
176 about the largest number of drinks consumed in a single day in the past year, as well as
177 frequency of consuming 8+ and 12+ drinks in a single day in the past year. We are building
178 toward a greater understanding of high-intensity drinking, and the accumulation of knowledge
179 regarding this very high quantity alcohol consumption has the potential to shape our future
180 efforts to mitigate the most serious alcohol consequences affecting our public health.

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182

183 **Acknowledgements**

184 This research was funded by support from the National Institute on Alcohol Abuse and
185 Alcoholism (R01 AA023504 to M. Patrick). The content here is solely the responsibility of the
186 author and does not necessarily represent the official views of the sponsors.

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