

# Sons of Alcoholics Report Greater Hangover Symptoms than Sons of Nonalcoholics: A Pilot Study

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**We investigated alcohol-induced hangovers among college men at high and low risk for alcoholism. Thirteen sons of alcoholics reported significantly ( $p < 0.001$ ) greater hangover symptoms in the past year than 25 sons of nonalcoholics. The two groups reported comparable quantity-frequency of recent drinking. To the extent that hangover represents an acute withdrawal syndrome to alcohol, this raises the question of whether sons of alcoholics are "dependence-prone." Key Words: Risk for Alcoholism, Hangover, Sons of Alcoholics, Acute Dependence, Negative Side Effects.**

**A**LCOHOL PRODUCES POTENT subjective effects that are thought to influence drinking behavior and play a role in the etiology of alcoholism.<sup>1</sup> However, aversive responses to alcohol persist as the blood alcohol concentration approaches zero. These symptoms, commonly known as "hangover," may influence subsequent drinking behavior. We investigated the potential significance of hangovers in the etiology of alcoholism by studying hangover symptomatology in high and low risk groups for alcoholism.

There are many possible causes for hangovers. Hangovers may be due in part to impurities in the drink or the diuretic effect of alcohol.<sup>2</sup> Another possibility is that hangovers result from compensatory responses to alcohol with longer durations than the drug action.<sup>3</sup> A related concept is that hangover symptoms may reflect an acute withdrawal syndrome<sup>4</sup> similar to that obtained with opiates.<sup>5</sup> Many of the symptoms of hangover, such as hyperthermia and dysphoria, are opposite in direction to the immediate effect of alcohol, suggesting a homeostatic response to alcohol withdrawal. In addition, the symptomatology of hangover and chronic withdrawal from alcohol overlap to a significant degree.<sup>6</sup> These possible causes for hangover are not mutually exclusive.

As an adverse side effect of alcohol, hangovers may act as a punisher for drinking and may limit subsequent drinking behavior. However, if a hangover represents an acute withdrawal syndrome,<sup>4</sup> then the hangover may reflect an addictive process that promotes drinking behavior.

For example, some individuals may drink alcohol in order to remove the hangover, which may reflect the beginning of an addictive process. In addition, acute dependence may be predictive of chronic dependence on alcohol.

We compared sons of alcoholics (SOA) and sons of nonalcoholics (SONA) in terms of their self-report of hangovers. SOA are reported to be 3 to 5 times more likely to become alcoholic than SONA.<sup>7,8</sup> In the absence of data, there are bases for at least two opposing predictions concerning differences between SOA and SONA in hangover reports. First, we reasoned that SOA may report greater hangover symptoms than SONA if they were "dependence-prone," and the hangover represented an acute dependence process. This assumes a continuity between acute withdrawal syndromes (i.e., hangover) and chronic dependence (i.e., alcoholism). An alternative prediction is that SOA might report fewer hangover symptoms than SONA if they were less sensitive to the intoxicating effects of alcohol.<sup>1</sup> In the same vein, Goodwin<sup>9</sup> has suggested that high risk individuals might be less prone to negative after-effects of alcohol, and therefore might have fewer natural limitations on their drinking behavior.

To test these predictions, we assessed self-report of hangovers during the past year, and after the first few times in which the subjects drank alcohol in their lifetimes. We also assessed current drinking behavior.

## METHOD

### *Subjects*

The subjects were 13 SOA and 25 SONA, 21 years old and over, recruited from the Purdue University community. Subjects were recruited from advertisements in the campus newspaper that did not mention alcohol in order to avoid bias in the recruitment process. Potential subjects who contacted us by telephone were screened by asking if their biological father was a "teetotaler, light, moderate, or heavy drinker." Those reporting that their father was a light drinker were tentatively designated SONA. This was done to exclude marginal cases in the control group. Those reporting that their father was a moderate or heavy drinker were administered the Short Michigan Alcoholism Screening Test<sup>10</sup> (SMAST) phrased in terms of their biological father's drinking practices. Subjects were tentatively classified as SOA if their fathers had attended Alcoholics Anonymous, or if they answered in the "alcoholic direction" to more than three items. All other subjects were excluded.

These tentative classifications were confirmed with the SMAST in written form phrased in terms of their biological fathers given to all subjects when they arrived for the experiment. We used the weighted scoring system from the full MAST rather than the more conventional unit weighting of items for the SMAST in order to reflect the differential importance of some items in classifying alcoholism. Final designation as

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SOA or SONA was based on the written SMAST given in the laboratory. Subjects whose fathers scored 7 or greater on the SMAST were classified as SOA, and subjects who scored 2 or less were classified as SONA. Subjects who reported a history of alcohol-related arrest or treatment, or a history of adverse reactions to alcohol were also excluded. Other researchers<sup>11,12</sup> have found that reports of paternal alcoholism are reliable in similar college populations.

The mean ages of the SOA ( $\bar{X} = 21.5$  years) and SONA ( $\bar{X} = 22.0$  years) did not differ significantly ( $F(1, 36) = 1.7$ , NS). The SMAST scores of the SOA ( $\bar{X} = 13.3$ ) and SONA ( $\bar{X} = 0.2$ ) were the basis for dividing subjects.

### Measures

All subjects were administered a two-part questionnaire to assess their experiences with hangovers. This questionnaire was constructed by the experimenter because we were unable to locate a reliable and valid measure of hangover. Part I of the questionnaire assessed hangover experiences within the past year, and Part II measured hangover experiences early in the drinking lifetimes of the subjects. Each part had 13 items. An example of an item in Part I was: "Within the past year when I drank alcohol, I got a hangover after drinking . . . 0%, 20%, 40%, 60%, 80%, or 100% of the times I drank." Subjects circled the appropriate percentage, and this was converted to a 6-point scale (e.g., 0% = 1, 100% = 6). Twelve other items in a similar format included such factors as headache the morning after, nausea, regrets about drinking, taking medication for the hangover, early morning awakenings, etc.

In Part II of the questionnaire, the same 13 items were phrased, "The first few times in my life I drank alcohol . . ." in order to assess early developmental responses to alcohol. Summing these 6-point items yielded two separate measures, one for early drinking experiences, and one for drinking within the past year. Each summary score had a possible range from 13 to 78. These summary scores were analyzed separately.

Secondly, subjects were given a quantity-frequency measure of alcohol consumption in which they estimated the number of beers, mixed drinks, and glasses of wine they consumed within a typical week over the past year. This measured their recent drinking history.

## RESULTS

We first tested their quantity-frequency scores in order to determine whether SOA and SONA differed in their recent drinking practices. The means, standard deviations, and  $F$ 's between groups are listed in Table 1. SOA and SONA did not differ in the amount of beer or glasses of wine they reported drinking in a typical week over the last month, but SOA reported drinking more mixed drinks than SONA. Note that the most popular drink in both groups was beer, and that mixed drinks accounted for a relatively small percentage of the drinking in these individuals. Note also in Table 1 that the variability of drinking within groups was very high. The multivariate test with number of beers, mixed drinks, and glasses of wine entered together was not significant ( $F(3,34) = 1.7$ , NS).

**Table 1.** Reports of Quantity-Frequency of Recent Drinking per Week among Sons of Alcoholics (SOA) and Sons of Nonalcoholics (SONA)

	SOA		SONA		$F(1,36)$
	$\bar{X}$	SD	$\bar{X}$	SD	
Beers	11.1	10.6	8.2	5.2	1.3
Mixed drinks	3.5	4.8	1.2	1.6	4.8*
Glasses of wine	1.6	2.0	0.8	1.1	0.6
Total	16.2	14.2	10.2	5.7	3.0

\*  $p < 0.05$ .

We performed an internal consistency analysis of the two parts of the hangover questionnaire. Cronbach's coefficient alpha was 0.85 for the early hangover items, and it was 0.77 for the recent hangover items. This indicated adequate internal consistency. The phrasing of the items, the correlation of each item with all the remaining items in the Part (I or II), and the  $t$ -statistic for the comparison between groups on that item are listed in Table 2. The correlations of each item with the remaining items were all positive, indicating that there were no items that needed to be dropped from the questionnaire.

We then tested the hangover summary scores between groups in multivariate analyses of variance. The difference between groups was significant ( $F(2,35) = 6.9$ ,  $p < 0.003$ ) in the multivariate test with both hangover scores (i.e., from Part I and Part II) entered. SOA and SONA did not differ significantly ( $F(1,36) = 0.0$ , NS) in their report of hangovers early in their drinking lifetime. The mean report of early hangovers was 30.6 (SD = 10.6) for the SOA and 30.3 (SD = 12.1) for the SONA. However, SOA reported significantly ( $F(1,36) = 12.7$ ,  $p < 0.001$ ) greater hangover than SONA during the past year. The summary scores and means for each group are depicted in Fig. 1 for recent hangover experiences. The mean report of recent hangover was 34.4 (SD = 9.0) for SOA and 25.8 (SD = 5.8) for SONA.

Finally, we performed analysis of covariance with quantity-frequency of drinking as the covariate. With the total number of beers, mixed drinks, and glasses of wine as the covariate, the report of recent hangovers was still significantly ( $F(1,33) = 8.8$ ,  $p < 0.005$ ) greater in the SOA

**Table 2.** Item Analysis of the Hangover Questionnaire

Item†	Early		Recent	
	$r$ ‡	$t$ § (1,36)	$r$ ‡	$t$ § (1,36)
1. . . . I got a hangover after drinking.	0.70	0.5	0.30	-1.5
2. . . . I got a headache while drinking.	0.09	-1.7	0.29	-2.7*
3. . . . I got a headache the morning after drinking.	0.74	0.2	0.45	-1.7
4. . . . I vomited after drinking.	0.57	0.2	0.39	-2.3*
5. . . . I fell asleep when I didn't want to.	0.48	-1.2	0.57	-1.8
6. . . . I took aspirin or other medication to get over a hangover.	0.32	0.5	0.13	-1.6
7. . . . I regretted my behavior while drinking.	0.74	-0.2	0.62	-2.2*
8. . . . I forgot some things that happened while I was drinking.	0.58	0.5	0.60	-2.2*
9. . . . I felt nauseous the morning after.	0.62	0.3	0.25	-0.2
10. . . . I did some things I normally wouldn't do while drinking.	0.54	0.0	0.50	-1.9
11. . . . I woke up too early the morning after drinking.	0.25	-1.1	0.11	0.3
12. . . . I woke up too late the morning after drinking.	0.26	-0.1	0.37	-2.6*
13. . . . I regretted having drunk too much.	0.83	0.0	0.59	-1.3
Total				

\*  $p < 0.05$ .

† For Early the item began with the phrase, "The first few times in my life I drank alcohol, . . ."

For Recent each item began with the phrase, "Within the past year when I drank alcohol, . . ."

‡ Correlation of each item with remaining 12 items.

§ Between groups of sons of alcoholics and sons of nonalcoholics.

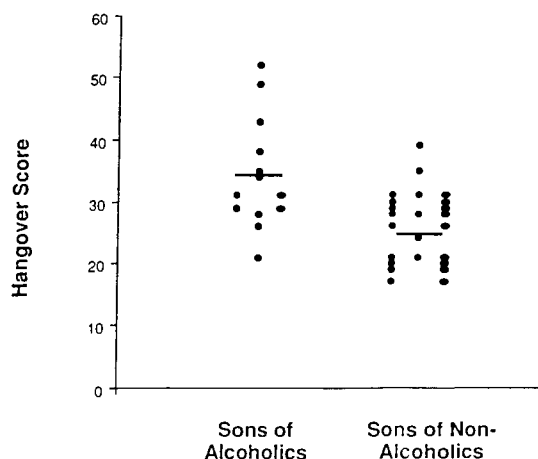


Fig. 1. Case-by-case depiction of SOA and SONA in terms of their summary reports of recent hangover experiences. Solid bars indicate means for each group.

compared with the SONA. This indicated that the amount of alcohol consumed could not account for the difference in the report of recent hangover symptoms between groups.

### DISCUSSION

We found that SOA reported greater hangover symptoms in the past year than SONA. This effect appeared not to be due to greater drinking in the SOA. Comparable drinking of college-aged SOA and SONA also has been reported by Alterman and his colleagues<sup>13,14</sup> in similar, but larger, samples. However, Sher and Walitzer<sup>15</sup> found that SOA reported more abusive drinking than SONA in a large college freshman sample. We did find that SOA reported drinking significantly more mixed drinks than SONA, although this was not significant in a multivariate analysis. Mixed drinks accounted for a relatively small percentage of the drinking in these samples, and beer drinking was much more common.

These data must be considered preliminary because we did not have a large sample of SOA. In addition, it is possible that the *pattern* of drinking, rather than the overall quantity-frequency may have differed between SOA and SONA. For example, it is possible that SOA had more drinks per occasion on fewer occasions, resulting in equivalent quantity-frequency in the two groups despite different patterns of drinking. In addition, we found no differences between SOA and SONA on their recollection of hangovers to early drinking experiences. There are many possible explanations for this failure. In any case, it appears that the development of more stable drinking practices may reveal these differences in hangovers.

We thought that SOA might report less hangover symptomatology if they used their alcoholic fathers' behavior as a measure of "typical" hangover intensity. Therefore, our results indicating greater hangover symptoms in SOA works against this prediction of a "contrast" effect that could bias self-report.

These results underscore the need for research in which

SOA and SONA are compared in terms of hangover after equivalent doses of alcohol are given under laboratory conditions. In this research, the precise amount of alcohol consumed (in g/kg bodyweight) could be controlled in order to measure hangovers without confounding by quantity of alcohol. Our results with a hangover questionnaire would appear to justify such laboratory research.

These results suggest that SOA may be "dependence-prone." In other words, SOA may be more prone to exhibit dependence phenomena compared with SONA with similar drinking histories. This assumes first that the hangover reflects, at least in part, an acute withdrawal syndrome to alcohol, and second, that acute dependence is predictive of chronic dependence phenomena. This might be tested by comparing acute or chronic withdrawal in alcoholics differing in familial alcoholism.

Although we know of no other studies of hangovers in SOA, our results contrast with Schuckit and Gold's<sup>1</sup> findings that SOA were less sensitive to the *immediate* effects of alcohol than SONA. However, Newlin and Thomson<sup>8</sup> found in a recent review of this literature that SOA showed *greater* responses to alcohol in the ascending limb of the blood alcohol curve, and lesser responses in the falling limb. Therefore, our results with hangovers are consistent with other results from the rising limb of the blood alcohol curve, even though they may not be consistent with results from the falling curve. This suggests the possibility that hangovers may be more related to rising limb phenomena than falling limb. It might be noted that Goodwin<sup>9</sup> found alcohol "blackouts" or memory loss were associated with rising limb phenomena.

Finally, our results underscore the need for more research on hangovers. Evidence that hangovers may differ between high and low risk groups for alcoholism suggests that this phenomenon may be significant in the etiology of alcoholism. In addition, improved measures are needed to assess the hangover both in self-report and after measured doses of alcohol in the laboratory.

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## NOTICE

It is with considerable sadness that I report to the alcohol research community the death of one of its members. On April 21, 1990, Dr. Reino Heikki Lisakki Ylikahri died in his sleep in Vantaa, Finland. Reino Ylikahri was a senior lecturer in Medical Chemistry at the University of Helsinki, Managing Editor of the *Journal of the Finnish Medical Association*, Secretary of the Finnish Society for Internal Medicine, and a renowned investigator in the field of endocrine effects of alcohol abuse.

He leaves a wife and three children as a tribute to his humanity. As a scientist and scholar, he leaves a legacy of published research dealing with topics relating to the endocrine and metabolic status of alcoholics.

Those of us who have had the opportunity to know Reino will miss his humor, his thirst for knowledge and, most importantly, his collegiality.

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