

# Identification of adolescents with a low level of response to alcohol using the “self rating of the effects of alcohol” questionnaire<sup>1</sup>

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## Summary

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The “self rating of the effects of alcohol” (SRE) questionnaire helps to identify persons with a low level of response to alcohol who might be prone to develop further alcohol-related problems. The questionnaire is a self-report of the number of drinks required to feel various states of inebriation in different periods of life: the first five times the subject ever drank alcohol, the time of heaviest drinking and alcohol use during three months preceding the interview. Each question aims to evaluate as precisely as possible the number of drinks taken to feel a specific effect. It does neither differentiate between innate sensitivity nor acquired tolerance. The SRE has been used in research with adult male populations and with middle-aged women. Adolescence is the period of initiation to alcohol use and provides a good opportunity for early prevention. In this sense the SRE might be useful for identifying at-risk subjects. Our study had two objectives. The first one was to assess whether an estimate of the level of response to alcohol could be related to drinking frequency and alcohol-related consequences. The second objective was to assess the characteristics (specificity and sensitivity) of the SRE-5 to identify binge-drinking adolescents and those with alcohol-related consequences. Level of response to alcohol was estimated in a sample of 68 boys and girls aged 15 to 21 over the first 5 experiences with alcohol

(SRE-5). Adolescents participating in this research met the criteria of illicit drug or alcohol use (at least one substance once a week during the previous three months) at the beginning of the study. Adolescents with high SRE-5 scores reported heavier patterns of recent alcohol use and more alcohol-related adverse consequences. A cut-off of 4 on the SRE-5 was the most appropriate for identifying heavy drinkers but rates of sensitivity and specificity were rather low (78.6 and 63.8%). In conclusion, low level of response to alcohol estimated by elevated SRE-5 is associated with reported heavy drinking and alcohol problems for regular substance user adolescents but the SRE cannot be considered as an appropriate screening tool for clinical use with our sample. Our results provided a suitable context for developing appropriate instruments and prevention strategies pertinent to early alcohol use in adolescents. Some additional limitations should also be acknowledged. Results cannot be representative of the general population since the subjects were recruited in a select way (criteria for illicit drug or alcohol use, at least one substance once a week during the previous three months) and the sample size was relatively small. A larger sample would also allow for a better study of gender and age differences in regard to level of response to alcohol.

*Keywords: adolescence; alcohol abuse; screening instrument; level of response to alcohol*

## Introduction

A low level of response (greater tolerance) to alcohol in 20-year-old men was shown to be predictive of future high consumption of alcohol per occasion and future alcohol-related problems [1,2]. The measurement of the level of response to alcohol is technically and methodologically difficult: it is best tested in laboratory conditions where spe-

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cific effects at a given blood alcohol level can be observed. Schuckit and colleagues [3] developed the Self Rating of the Effects of Alcohol (SRE) questionnaire and demonstrated that the SRE helps to identify persons with a low level of response to alcohol who might be prone to develop further alcohol-related problems. The questionnaire is a self-report of the number of drinks required to feel various states of inebriation in different periods of life. It does neither differentiate between innate sensitivity nor acquired tolerance. However, the reported higher number of drinks needed to reach inebriation is a correlate of a low level of response to alcohol during an alcohol challenge. A Swiss study reported high SRE scores with reference to the first five uses of alcohol (SRE-5) in primary care adult patients with a diagnosis of alcohol abuse or dependence [4]. The SRE has also shown good correlation with alcohol use 15 years earlier in a sample of 40-year-olds [5]. The SRE has been used in research with adult male populations and with middle-aged women [6–8].

Adolescence is the period of initiation to alcohol use and provides a good opportunity for early prevention. Optimal prevention strategies should identify individuals with elevated risk of alcohol use disorders. In this sense the SRE might be useful for identifying at-risk subjects. Recently, Schuckit and colleagues [9] used the SRE with 12- to 13-year-old adolescents. Data indicated that SRE-5 correlated better (at 0.61) with the maximum number of drinks consumed at one occasion than the number of alcohol problems (0.25) and the frequency of drinking (0.29). Results also indicated that SRE-5 was a better predictive factor of maximum drinks per occasion when considering other individual factors as smoking and marijuana histories, sex and weight.

Our study had two objectives. The first one was to assess whether an estimate of the level of response to alcohol (with reference to the first five uses provided by the SRE-5) could be related to drinking frequency, binge drinking (high number of drinks consumed at one time, episodes of binge drinking, number of blackouts) and alcohol-related consequences. Within this perspective, we postulate that a group with an estimated high tolerance to alcohol presents more episodes of binge drinking or heavy drinking and alcohol-related problems than a group with an estimated lower tolerance to alcohol. The second objective was to assess the characteristics of the SRE-5 to identify binge-drinking adolescents and those with alcohol-related consequences.

## Subjects and method

This study was inserted in a broader longitudinal research project on factors related to substance-use onset and course during adolescence (ref. 01.001.504). The 102 subjects who met the criteria for illicit drug or alcohol use (i.e. at least one substance once a week during the previous three months) were recruited in the general population and in socioeducative institutions. Ethical Committee approval was obtained. Adolescents were evaluated four times between 1999 and 2002 with a 1-year interval. The SRE was introduced at the second and third evaluation (time two and time three). Ninety subjects (60 boys and 30 girls) completed the SRE in a face-to-face interview at time two. Data were considered as valid for 68 subjects (44 boys and 24 girls, aged 15 to 21). Twenty-two subjects could not provide estimates for the first five drinking episodes and could therefore not be included in analyses.

Among the subjects who completed the SRE with valid data 57.0% used cannabis at least once per day during the month preceding the interview, 20.2% used hallucinogens (LSD, acid or mushrooms), 17.6% used ecstasy and 8.8% used cocaine at least once during the same period. Regarding lifetime substance use, 97.1% used cannabis, 64.4% used hallucinogens, 44.1% used cocaine and 42.6% used ecstasy. Most adolescents were substance-poly-users. Among the subjects, 38 were recruited from the general population, 19 were from socioeducative institutions or under the supervision of a social worker, 3 were from job reinsertion programmes, 3 were out-patients in institutions specialised in treating substance abuse, 2 were from a prison context, 2 were from in-patient programmes in psychiatric or substance abuse treatment centres and one was an out-patient in a multidisciplinary adolescent treatment unit.

Data from the SRE and the French version of the Adolescent Drug Abuse Diagnosis [10] were used. These two questionnaires were completed in a face-to-face interview conducted by a trained research assistant. The SRE is composed of 4 questions retrospectively assessing each of three periods: the first five times the subject ever drank alcohol, the time of heaviest drinking and alcohol use during three months preceding the interview. Each question aims to evaluate as precisely as possible the number of drinks taken to feel a specific effect: “How many drinks did it take for you to begin to feel any different?”, “How many drinks did it take for you to feel a bit dizzy or to begin to slur your speech?”, “How many drinks did it for you to begin stumbling or walking in an uncoordinated

manner?" and finally, "How many drinks did it take for you to pass out or fall asleep when you did not want to?" One drink was defined as 33 cl of beer, 1.5 dl of wine or 3 cl of liquor (straight or mixed in a cocktail). In the context of this study only the first five drinking situations and alcohol use over the last three months were taken into account. For the two periods evaluated (the first five times and the last three months), a score was computed by dividing the total number of drinks recorded in the four possible cells by the number of cells endorsed. Adolescents who did not remember how many drinks they needed to reach a particular inebriation state were excluded from the study ( $N = 22$ ). Their scores would not have been comparable to other adolescents' scores. This is the reason why only 68 adolescents were included in this study.

In order to generate a single score which gives an estimation of the level of response to alcohol, the SRE "first 5 times" (SRE-5) was considered. This score reflects very early experiences with alcohol. Two groups were defined on the basis of the SRE-5 score's distribution: a cut-off point at 4.5 was arbitrarily selected in order to maximise differences between subjects with high SRE-5 scores and others. The "high SRE-5" group included subjects with SRE-5 scores  $\geq 4.5$  (33% of the sample, upper tertile), whereas subjects with SRE-5 scores  $< 4.5$  were assigned to the "low SRE-5" group (66% of the sample, lower two tertiles). Recent alcohol use and problems were evaluated using the SRE scores for the previous three months and items included in the alcohol section of the ADAD. The ADAD is a multi-dimensional tool assessing 9 important adolescent life areas including alcohol and drug use: episodes of binge drinking in the previous month, number of days of alcohol use in the previous months, number of blackouts while using alcohol in the previous 9 months, percentage of adolescents consuming 4 drinks or more per occasion, severity rating score and composite scores from the alcohol dimension. The ADAD severity rating score is a clinical assessment of the adolescents' problem severity and need for treatment [10], while the composite score is based on factual items and is an attempt to objectively measure the degree of severity of the problem. Sociodemographic data were also collected. Mann-Whitney *U*-test and Chi-square test were performed to compare means between the two groups. The relatively small size of the sample did not allow taking into account sex and age differences. Finally, binge drinking (5 or more episodes of binge drinking in the previous month) and alcohol-related problems (severity rating of the alcohol section of ADAD) were used in order to determine the psychometric character-

istics of the SRE-5 (sensitivity, specificity, positive and negative predictive values) in identifying heavy drinkers. At time three, 40 subjects completed the SRE-5 with valid data, enabling to assess the test-retest reliability of the questionnaire.

## Results

Complete data on the SRE were gathered from 68 adolescents. The mean age was 17.9 ( $\pm 1.70$ ) years, 70.6% were Swiss and 29.4% came from other European countries. The mean SRE-5 score was 4.1 ( $\pm 0.20$ ) drinks. There were 23 adolescents (17 boys and 6 girls) in the "high SRE-5" group and 45 adolescents (27 boys and 18 girls) in the "low SRE-5" group.

In order to verify that potential group differences in drinking patterns did not reflect individual differences between high and low SRE-5 subjects, the two groups were first compared on demographic, social, familial and life-habits characteristics. Table 1 indicates that the two groups were similar in age, proportion of boys and girls, proportion of age range, educational and economic status, proportions of parents with alcohol-related problems and number of cigarettes smoked over the last month. Table 1 also compares the recent alcohol use of the two groups. According to our hypothesis, adolescents in the "high SRE-5" group differed significantly from adolescents in the "low SRE-5" group on SRE-5 scores and most indices of recent alcohol use: they had more episodes of binge drinking, more alcohol-related problems and greater need for assistance as indicated by higher ADAD scores, higher scores on the SRE related to the previous three months and spent more money on alcohol use. Subjects with high SRE-5 scores also reported more drinking days and a higher percentage of who had consumed 4 drinks per occasion and had a higher number of blackouts in the previous 9 months.

Table 2 reports the sensitivity and specificity of the SRE-5 for identifying subjects with important problems of alcohol use (ADAD severity rating  $\geq 6$ ) and those with heavier alcohol use (5 or more episodes of binge drinking over the last month). On the basis of an SRE-5 cut-off score of 4, the instrument identified 71.4% of the adolescents with important problems of alcohol use (sensitivity), whereas 59.3% of adolescents identified as not having important problems of alcohol use were correctly classified (specificity). An SRE-5 cut-off score of 4 also correctly identified 78.6% of the adolescents reporting 5 or more episodes of binge drinking over the last month, whereas 63.8% of the

**Table 1** Comparison between high and low SRE-5 groups regarding sociodemographic characteristics, alcohol use and alcohol-related problems.

	parameters	group 1 high SRE-5 n = 23	group 2 low SRE-5 n = 45	statistical test: Chi-square or Mann-Whitney (U)
<b>sociocultural variables</b>				
<i>age and sex</i>	age	17.7 (± 1.63)	18.0 (± 1.38)	-0.879
	% boys	73.9	60	1.291
	% 18 to 21 years old	47.8	44.1	0.070
<i>educational and economic status</i>	% dropped out or expelled from school	33.3	46.5	1.005
	% low or middle socio-economic status	55.6	63.9	0.351
<i>alcohol-related problems in the family</i>	% father with alcohol problem	18.2	23.3	0.222
	% mother with alcohol problem	4.5	13.3	1.221
<i>cigarettes</i>	number of cigarettes per day during the previous month	17.5 (± 11.28)	13.1 (± 8.21)	-0.153
<b>alcohol variables</b>				
<i>severity and diagnoses</i>	SRE-5 score	6.2 (± 1.90)	3.1 (± 0.80)	-6.743**
	alcohol composite score (0-75; ADAD)	25.3 (± 11.61)	17.6 (± 9.96)	-2.621**
	alcohol severity rating score (0-9; ADAD)	3.3 (± 2.07)	4.7 (± 2.02)	-2.461**
	SRE A score (previous three months)	6.9 (± 3.06)	5.6 (± 3.57)	-1.909*
<i>episodes of alcohol use</i>	# days drinking (last month)	10.7 (± 8.20)	6.8 (± 7.53)	-0.153
<i>quantity of alcohol use and episodes of drunkenness</i>	% 5 or more episodes of binge drinking in the previous month	40	14.6	4.891**
	# of blackouts (previous 9 months)	4.0 (± 10.81)	0.86 (± 2.16)	-1.244
	% 4 drinks per occasion (last month) <sup>1</sup>	61.9	51.4	0.603

\* p < 0.1

\*\* p < 0.05

<sup>1</sup> One drink was defined as 33 cl of beer, 1.5 dl of wine or 3 cl of liquor (straight or mixed in a cocktail).

**Table 2** Characteristics of the SRE-5 to identify adolescents with heavy drinking or alcohol-related problems.

	SRE-5 scores (cut-off)	sensitivity %	specificity %	positive predictive value (%)	negative predictive value (%)
% 5 or more episodes of binge drinking in the previous month	3	78	23.4	23.4	78.6
	3.5	78.6	55.3	34.4	89.7
	<b>4</b>	<b>78.6</b>	<b>63.8</b>	<b>39.3</b>	<b>90.9</b>
	4.5	57.1	74.5	40	85.4
	5	50	74.5	36.8	83.3
treatment necessary (severity rating score of alcohol area ADAD = 6)	3	78.6	20.4	20.4	78.6
	3.5	71.4	50	27	87.1
	<b>4</b>	<b>71.4</b>	<b>59.3</b>	<b>31.3</b>	<b>88.9</b>
	4.5	57.1	72.4	34.8	86.7
	5	57.1	75.9	87.2	38.1

adolescents who had less than 5 episodes were correctly classified by the instrument (specificity).

Considering that the distribution of SRE-5 scores was not normal, the test-retest reliability between the first and second assessments was analysed non-parametrically using the Spearman's rho correlation coefficient and the Wilcoxon distribution free-signed rank test. Results of Spearman's rho was 0.479 ( $p < 0.001$ ) and the Wilcoxon test indicated a non-significant difference between the two assessments ( $Z = -0.324; p = 0.746$ ).

## Discussion

Results indicated that there were significant differences between the two adolescent groups on most of the current alcohol use indices. When comparing specifically SRE-5 scores and SRE scores for the previous three months, verbal reports about early drinking experiences were related to verbal reports about drinking experiences in the last three months. However, it differed in an important way from any conclusion suggesting that early drinking predicts later drinking. Indeed, the estimate of past alcohol use provided might be biased either by recent experiences with alcohol use or by long-term memory distortions [4–7]. The relatively short interval though between current use and first experiences with alcohol use in adolescents might improve the accuracy of subjects' recollections. Thus, these data may be more reliable than recollections from adult samples. Nevertheless, this study also indicated that 22 out of 90 (or 24.4%) could not provide estimates for the first five drinking episodes due to the lack of memory, which constitutes a limitation in the applicability of the SRE in our sample.

Data reported a trend in the same direction found in the study of Schuckit and colleagues with an adolescent population [9]: adolescents with lower levels of response to alcohol had a higher frequency of drinking and more blackouts during the previous nine months, although these results were not significant. The differences between the two groups were confirmed by the number of episodes of binge drinking in the previous month, the composite scores and the severity rating scores in the alcohol section of the ADAD, which indicated a more problematic use of alcohol and greater need for assistance among subjects in the "high SRE-5" group. Overall, the SRE-5 has pointed out some strong associations between an estimated low level of response to alcohol and recent heavy drinking and alcohol problems. These results provided a suitable context for developing appropriate instru-

ments and prevention strategies pertinent to early alcohol use in adolescents.

Considering the sensitivity and specificity of the SRE, it appeared that the optimal cut-off score was equal to 4 for both the quantity of alcohol use and the ADAD alcohol severity rating. Using this cut-off on the SRE-5 score, the instrument could discriminate with moderate sensitivity (71.4%) and specificity (59.3%) between adolescents with and without alcohol-related problems (i.e. severity scores). The results were better when attempting to identify adolescents who reported at least five episodes of binge drinking over the last month, with a sensitivity of 78.6% and a specificity of 63.8%. The test-retest reliability of the questionnaire was acceptable but rates of specificity and sensitivity showed that SRE-5 could not be used as a screening tool in our sample. In a future study it could be worthwhile to test the SRE with a group of adolescents representative of the general population to assess its ability to detect at-risk adolescents. Those participating in this research met the criteria of illicit drug or alcohol use (at least one substance once a week during the previous three months) at the beginning of the study. Most of the subjects used cannabis regularly or have used it in the past. Poly-substance use made it difficult to identify specific problems related to excessive alcohol use.

Some additional limitations should also be acknowledged. Results cannot be representative of the general population since the subjects have been recruited in a select way (criteria for illicit drug or alcohol use, at least one substance once a week during the previous three months) and the sample size was relatively small. Nevertheless, it may appear to be more promising when a larger sample is studied. A larger sample would also allow for a better study of gender and age differences in regard to level of response to alcohol. In this study, there were no significant differences between the "high" and "low SRE-5" groups neither in the percent of fathers nor in the percent of mothers with alcohol problems. There was no difference in the rate of alcohol-related problems among parents, which differed from the findings of Schuckit et al. [9]. Future research should include more evidence of family history for alcohol disorders than only the diagnostic "problems". Such analyses may show a stronger association with subsequent at-risk alcohol use and disorders in offsprings. Finally, there was no assessment of antisocial personality disorder or conduct disorder.

## Appendix

The SRE form used for this study to be filled out by subjects regarding the number of standard drinks required to produce four possible types of effects at two different time points:

On this form, please tell us about your ACTUAL experiences of drinking alcohol. Please answer each question as accurately as possible. Give only one answer for each question. Please not dot give ranges (i.e. do not list 4–6 drinks; write 5).

To fill out this form:

- One drink was defined as 33 cl of beer, 1.5 dl of wine or 3 cl of liquor (straight or mixed in a cocktail).
  - If a question does not apply to you, write N/A in the space provided and move to the question that applies to you.
- 1 Begin with column A: How many drinks did it *actually* take “for you to begin to feel any different” *the first 5 times (or so) you ever drank alcohol?* DO NOT count sips taken as a child. Place your answer in column A, just to the right of Question 1.
  - 2 How many drinks did it *actually* take “for you to feel a bit dizzy, or to begin to slur your speech” *the first 5 times you ever drank?* Place your answer in Column A, next to Question 2.
  - 3 Now, complete column A for Question 3 and 4, filling in the number of drinks it *actually* took for you to feel the effect listed in the left side of the Table.
  - 4 Next, fill in the same information for column B: for your most recent period of drinking at least once a month for 3 consecutive months.

	A	B
effect of drinking alcohol (answer only those which apply to your actual drinking experiences)	first 5 times you ever drank	3 months drinking once a month

- 1) How many drinks did it take for you to begin to feel different (where you could feel an effect)?
- 2) How many drinks did it take for you to feel a bit dizzy or to begin to slur your speech?
- 3) How many drinks did it take for you to begin stumbling or walking in an uncoordinated manner?
- 4) How many drinks did it take for you to pass out or fall asleep when you did not want to?

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