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**Parental alcohol dependence, socioeconomic disadvantage  
and alcohol and cannabis dependence among young adults in the community.**

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Abbreviations: SAGE (Susceptibility Addiction Gene Environment); CNIL (Commission Nationale  
Informatique et Liberté) ; DIGS (Diagnostic Interview for Genetic Studies) ; OR (Odds Ratio).

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## **Abstract**

We tested the hypothesis that socioeconomic disadvantage exacerbates the intergenerational transmission of substance dependence. Among 3,056 community-based young adults (18-22 years, 2007), the prevalence of alcohol dependence (WHO AUDIT, 5.8%) and cannabis dependence (DSM IV criteria, 7.3%) was doubled in the presence of combined parental alcohol dependence and socioeconomic disadvantage.

## **Introduction**

In industrialized countries, alcohol and illicit drug-related problems affect 5% of the population (2;19;27) and cost 1-3% of gross domestic product (GDP) (13;17;20;21;23), constituting a public health and societal challenge. Individuals with a family history of substance dependence are at high risk (1;28;35); however, for reasons that are unknown, intergenerational transmission is heterogeneous, that is not all individuals with family history of substance dependence have substance-related problems themselves (48).

Using data from a community-based study, we test the hypothesis that intergenerational transmission of substance dependence varies with exposure to socioeconomic disadvantage, previously shown to predict alcohol and drug use disorders (15;16;34). Parental substance-related problems are captured by history of alcohol dependence, the most frequent form of substance dependence (2;27) and a common correlate of illicit drug dependence (26). Analyses control for factors associated both with family socioeconomic and substance dependence characteristics and with youths' risk of alcohol and cannabis dependence, including immigrant status, history of sexual abuse (18), and mental health difficulties such as conduct disorder and depression (18;34).

## **Material and Methods**

The SAGE (Susceptibility Addiction Gene Environment) study examines factors associated with psychiatric disorders and alcohol and drug use among young adults in France (n= 3,056 youths in postgraduate training in North-Eastern France, March-April 2007, mean age: 20, sd: 1.4, 60.1% male, 79% response rate) (30). The study received approval from France's national body supervising ethical data collection (CNIL).

Alcohol dependence was assessed using the well-validated 10-item WHO AUDIT questionnaire (7;10) and defined as a score of  $\geq 13$  (males) or  $\geq 12$  (females). Cannabis dependence was assessed using a 10-item questionnaire derived from the Diagnostic Interview for Genetic Studies (DGIS) (37) and defined as  $\geq 3$  symptoms among the 7 DSM IV criteria. This questionnaire is concurrent with a semi-structured clinical interview (30).

Parental (mother's and father's) alcohol dependence was ascertained using the 13-item abridged version of the SMAST (Short Michigan Alcoholism Screening Test), which has good reliability and validity (14) and defined as  $\geq 3$  symptoms (45). Participants with one or two parents with alcohol dependence had positive parental history (85.4%: fathers, 12.6%: both parents).

Following previous research, socioeconomic disadvantage was ascertained as a composite of parental employment status and educational level (4;46) and defined as parental unemployment or <secondary education.

Lifetime history of sexual abuse was ascertained using one item on attempted or completed unwanted sexual intercourse. Adolescent conduct disorder was measured using a self-report questionnaire derived from the DIGS (37;41) and defined as  $\geq 3$  of the 15 DSM-IV criteria before age 15 (3). Current depression was assessed using the 10-item Adolescent Depression Rating Scale (ADRS) (43) and defined as  $\geq 3$  positive symptoms. Immigrant status was defined as at least one parent born not in France (58.3% in this group had two parents born abroad). Immigrant participants primarily came from North Africa (Algeria, Morocco, Tunisia: 38.6%) or Europe (37.0%), but due to insufficient statistical power we could not distinguish these subgroups in the analyses.

To test the hypothesis that socioeconomic disadvantage exacerbates the intergenerational transmission of alcohol and cannabis dependence, we created a combined measure of youths' familial risk (low risk: no parental alcohol dependence  $n=2,476$ ; intermediate risk: parental alcohol dependence but no socioeconomic disadvantage  $n=339$ ; high risk: parental alcohol dependence and socioeconomic disadvantage  $n=69$ ). First, analyses were controlled for sex. Next, we additionally controlled for all covariates. Data were analyzed using logistic regression models in the SAS statistical software package (SAS V9, Carey, North Caroline).

## **Results**

The prevalence rates of alcohol and cannabis dependence among study youths were 5.8% and 7.3% (correlation coefficient: 0.26,  $p$ -value  $<0.0001$ ). Youths whose parents had a history of

alcohol dependence were more likely to have alcohol or cannabis dependence themselves (fully-adjusted ORs: alcohol dependence: 1.66, 95% CI 1.20-2.48, cannabis dependence: 1.48, 95% CI 1.02-2.15). Socioeconomic disadvantage was not independently associated with either study outcome (fully-adjusted ORs: alcohol dependence: 0.68, 95% CI 0.38-1.23, cannabis dependence: 0.92, 95% CI 0.57-1.47). **Table 1** shows youths' characteristics in relation to alcohol and cannabis dependence. As depicted in **Figure 1**, we observed a gradient-like association between familial risk and youths' alcohol or cannabis dependence. In sex-adjusted regression analyses (**Table 2**), a family history of alcohol dependence was associated with alcohol or cannabis dependence, especially in the presence of socioeconomic disadvantage (ORs: 2.64, 95% CI 1.22-5.70 and 2.27, 95% CI 1.10-4.70). In fully-adjusted analyses (**Table 2**), the ORs were decreased, however the likelihood of cannabis dependence in relation to high familial risk remained elevated and statistically significant. Formal tests of additive statistical interactions (44), conducted using a method proposed by Andersson et al. (5), showed that the Relative Excess Risk due to Interaction (RERI) between parental alcohol dependence and socioeconomic disadvantage was much different from 0 but did not reach statistical significance, probably due to a small number of cases (RERI: for alcohol dependence: 1.03, 95% CI -0.99-3.06, for cannabis dependence: 0.48, 95% CI -1.33-2.31).

## **Discussion**

In a community-based sample, young adults with parental history of alcohol dependence were disproportionately likely to have alcohol or cannabis dependence, particularly if they experienced socioeconomic disadvantage. This social disparity in the intergenerational transmission of substance dependence partly reflected risk factors of substance dependence including history of sexual abuse and mental health difficulties. Addictive behaviors probably result from a combination of heritable and environmental risks and youths who cumulate both risks may be especially vulnerable.

The study's limitations are: 1) a sample of postgraduate students; 2) a cross-sectional design; 3) participant reports of parental alcohol dependence. In France, approximately 50% of youths

achieve postgraduate training and our sample may not include individuals who experience severe socioeconomic hardship (22;38). Nevertheless, SAGE study participants represent diverse socioeconomic backgrounds and have levels of alcohol and cannabis disorders similar to national samples (31); thus our results should apply to other settings. Youths' substance-related problems are unlikely to predict parental alcohol dependence or socioeconomic disadvantage; however participants' reports may be influenced by substance use. Reassuringly, informant reports of substance dependence are highly specific (>90%) (36) and our results are concurrent with those of prospective studies (1). Still, additional studies using multiple assessments of family history of alcohol and drug dependence would be useful.

Our study's main strength is a large sample of community-based young adults. The period of transition between adolescence and adulthood is key in the emergence of long-term patterns of substance abuse (11), yet young adults are difficult to include in epidemiological studies and data on this demographic group are few. Respectively 5.8% and 7.3% of study participants had alcohol and cannabis dependence, adding to evidence that a non-negligible proportion of youths does not desist from problematic substance use upon entering adulthood (33;39;40). Youths' rates of substance use have increased in recent years (8;12) and better understanding of lifelong risk trajectories is needed.

Our study included immigrant youths, who are rarely studied in France (32). Compared to non-immigrants, this group had lower rates of alcohol dependence but comparable rates of cannabis dependence, implying specificity in substance use in relation to immigration status (25). Immigrants are disproportionately exposed to socioeconomic disadvantage, which justifies close monitoring of their health in a way that accounts for community of origin, conditions of migration, and acculturation in the host country (47).

In our study, the cumulative effect of parental alcohol dependence and socioeconomic disadvantage on youths' substance dependence was partly explained by risk factors such as history of sexual abuse, adolescent conduct disorder, and depression. The mechanisms linking familial

context to these risk factors may include poor parenting (6;9;24;29) as well as high levels of family stressors such as financial difficulties, divorce or family conflict (9;42). Additionally, the intergenerational transmission of substance dependence may also reflect genetic influences, the expression of which may be enhanced in detrimental environmental conditions (1). It is also possible that parental alcohol dependence leads to family socioeconomic disadvantage; however, data needed to test this hypothesis were not available in our study. In the future, the moderation of genetic risk of substance dependence by socioeconomic disadvantage should be tested.

## **Conclusion**

Parents appear to have a lasting influence on their offspring's substance use well into adulthood. Improvements in families' socioeconomic conditions could reduce the transmission of substance dependence to the next generation.



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**Conflict of interest:** none.

**Table 1. Demographic, family and mental health characteristics of young adults in relation to alcohol and cannabis dependence: the SAGE study (n=2,884).**

	<b>Prevalence (%)</b>	<b>Alcohol dependence OR (95% CI)</b>	<b>Cannabis dependence OR (95% CI)</b>
<b>Family characteristics</b>			
Parental alcohol dependence: Absent	85.9	1.0	1.0
Present	14.1	1.99 (1.38-2.89)	1.75 (1.23-2.49)
Socioeconomic disadvantage: Absent	87.2	1.0	1.0
Present	12.8	0.65 (0.38-1.12)	0.99 (0.64-1.52)
Familial risk <sup>1</sup> : Low	85.9	1.0	1.0
Intermediate	11.8	1.91 (1.28-2.87)	1.67 (1.14-2.46)
High	2.4	2.41 (1.13-5.14)	2.14 (1.04-4.40)
<b>Demographic characteristics</b>			
Sex: Female	40.5	1.0	1.0
Male	59.5	3.32 (2.22-4.96)	2.03 (1.47-2.80)
Immigrant status: Immigrant	21.4	1.0	1.0
Non-immigrant	78.6	1.87 (1.18-2.95)	1.08 (0.76-1.55)
<b>Mental health and experience of sexual abuse</b>			
History of sexual abuse: Absent	97.0	1.0	1.0
Present	3.0	1.97 (0.97-4.00)	2.43 (1.32-4.47)
Adolescent conduct disorder: Absent	88.3	1.0	1.0
Present	11.7	5.17 (3.69-7.25)	5.00 (3.65-6.85)
Depression: Absent	78.8	1.0	1.0
Present	21.2	1.81 (1.29-2.55)	2.18 (1.21-3.93)

<sup>1</sup> Family risk: low=no parental alcohol dependence, intermediate=parental alcohol dependence, no socioeconomic disadvantage; high: parental alcohol dependence and socioeconomic disadvantage.

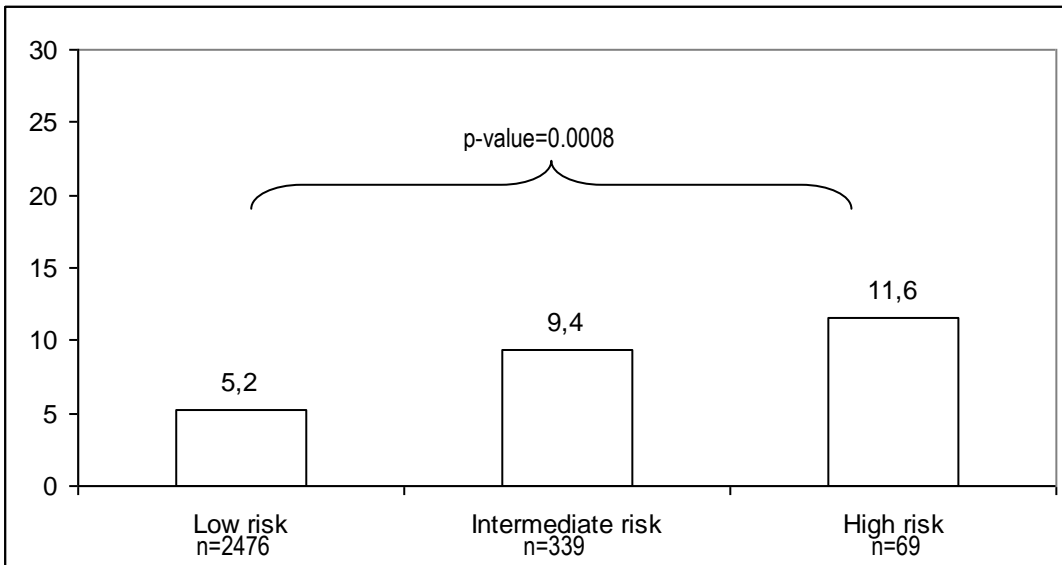
**Table 2. Familial risk level in relation to alcohol and cannabis dependence among young adults: the SAGE study (logistic regression analysis OR, 95% CI)**

	<b>Alcohol dependence</b>	<b>Cannabis dependence</b>
<b>Sex-adjusted models (n=2884)</b>		
Familial risk <sup>1</sup> : Low	1.0	1.0
Intermediate	2.09 (1.39-3.15)	1.77 (1.20-2.60)
High	2.64 (1.22-5.70)	2.27 (1.10-4.70)
Sex: Female	1.0	1.0
Male	3.46 (2.31-5.18)	2.09 (1.57-2.89)
<b>Fully-adjusted models (n=2851)</b>		
Familial risk <sup>1</sup> : Low	1.0	1.0
Intermediate	1.61 (1.04-2.48)	1.52 (1.02-2.28)
High	2.06 (0.88-4.82)	1.43 (1.62-3.32)
Sex: Female	1.0	1.0
Male	3.29 (2.10-5.12)	1.96 (1.37-2.81)
Immigrant status: Immigrant	1.0	1.0
Non-immigrant	2.19 (1.36-3.53)	1.21 (0.83-1.75)
History of sexual abuse: Absent	1.0	1.0
Present	2.42 (1.10-5.31)	2.42 (1.24-4.73)
Adolescent conduct disorder: Absent	1.0	1.0
Present	3.80 (2.65-5.46)	3.81 (2.72-5.33)
Depression: Absent	1.0	1.0
Present	1.83 (1.26-2.64)	1.61 (1.15-2.25)

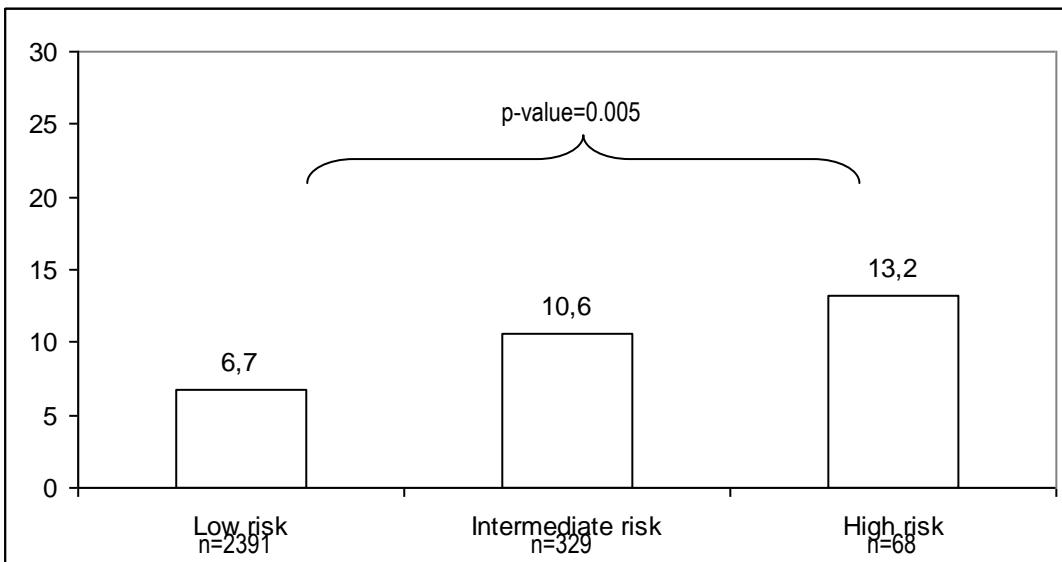
<sup>1</sup> Parental and socioeconomic risk: low=no parental alcohol dependence, intermediate=parental alcohol dependence, no socioeconomic disadvantage; high: parental alcohol dependence and socioeconomic disadvantage.

**Figure 1 Prevalence of alcohol and cannabis dependence among young adults according to familial risk level: the SAGE study (%).**

**A. Alcohol dependence**



**B. Cannabis dependence**



Low risk: no parental alcohol dependence

Intermediate risk: parental alcohol dependence and no socioeconomic disadvantage

High risk: parental alcohol dependence and socioeconomic disadvantage

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