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Word count: Abstract: 242
Text: 4216
Tables 2
Figures 2

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Abstract

Background: Low socioeconomic position predicts risk of substance abuse, yet few studies tested the role of preexisting familial and individual characteristics. **Methods**: Data come from the TEMPO (Trajectoires Epidémiologiques en POpulation) study (community sample in France, 1991-2009, n=1,103, 22-35 years in 2009) set up among offspring of participants of an epidemiological study (GAZEL). Past 12-months substance use was assessed in 2009 by self-completed mail survey: regular tobacco smoking, alcohol abuse (AUDIT), cannabis use, problematic cannabis use (CAST), other illegal drug use. Socioeconomic position was defined by educational attainment, occupational grade, employment stability and unemployment. Covariates included demographics (age, sex, relationship status, parenthood), family background (parental income, parental tobacco smoking, parental alcohol use), and juvenile characteristics (psychological problems, academic difficulties) measured longitudinally.

Results: 35.8% of study participants were regular smokers, 14.3% abused alcohol, 22.6% used cannabis (6.3% had problematic cannabis use) and 4.1% used other illegal drugs. Except for alcohol abuse, substance use rates were systematically higher in individuals with low, rather than intermediate/high, socioeconomic position (age and sex-adjusted ORs from 1.75 for cannabis use to 2.11 for tobacco smoking and 2.44 for problematic cannabis use). In multivariate analyses these socioeconomic disparities were decreased, but remained statistically significant (except for illegal drugs other than cannabis).

Conclusions: Tobacco smoking, alcohol, cannabis and polysubstance use are common behaviors among young adults, particularly those experiencing

socioeconomic disadvantage. Interventions aiming to decrease substance abuse and reduce socioeconomic inequalities in this area should be implemented early in life.

Keywords: socioeconomic position; tobacco; alcohol; cannabis; longitudinal cohort study; epidemiology

1. Introduction

Adolescents and young adults are at high risk of tobacco, alcohol, cannabis or other illegal drugs use (Choquet et al., 2004; Merline et al., 2004). Prevalence of substance use tends to decrease during the 20s and 30s (except for tobacco), but a significant fraction of young adults continue using and abusing alcohol and illegal drugs (Melchior et al., 2008;Schulenberg et al., 2005). In particular, a growing number of young adults use cannabis even after embracing social roles such as work and parenthood, possibly jeopardizing their long-term health, social, and economic outcomes (Perkonigg et al., 1998).

In industrialized countries, risk of substance abuse appears especially high in youths from socioeconomically disadvantaged backgrounds (Fothergill and Ensminger, 2006a;Hanson and Chen, 2007). To date research in this area was limited to the United States (Merline et al., 2004;Windle et al., 2005;Windle and Wiesner, 2004), Australia/New Zealand (Swift et al., 2008), and Northern Europe (Netherlands, Germany) (Karam et al., 2007;Perkonigg et al., 2008), and few studies were able to account for pre-existing individual and family characteristics which may determine both socioeconomic position and substance abuse in young adulthood.

Studying the socioeconomic context of substance use in France is particularly interesting. First, in French youths and adults, levels of substance use are high: a nationally representative study conducted in 17-year olds reported 12-month prevalences of 29% for regular tobacco smoking, 49% for binge drink and 25% for cannabis use; in the adult population, an estimated 6% meet criteria for an alcohol-related disorder (Beck et al., 2006a;Hibell et al., 2000;Lépine et al., 2005). While adolescents' levels of tobacco use have decreased in recent years, rates of alcohol abuse have increased, and the use of cannabis has stabilized at approximately 25% (any use over 12 months) (Legleye et al., 2009). In parallel, experimentation and

regular use of other illegal drugs, particularly cocaine, has increased (Beck et al., 2006b). Second, despite high educational achievement (83% of 25-35 year olds in France have a high school degree, as compared with an average of 79% in the OECD)(OECD, 2010), French youths have low labour force participation (10% are unemployed compared to 9% in the OECD) and disproportionately face job instability (51% are in temporary employment compared to 25% in the OECD) (OECD, 2010). Given how difficult it is to transition to the labour market, socioeconomic disparities with regard to substance use may be more pronounced than in other countries. To date, research on socioeconomic position and tobacco, alcohol and cannabis use in French youths was based on cross-sectional samples, and the contribution of early life characteristics has not been fully investigated (Baumann et al., 2007;Legleye et al., 2008;Peretti-Watel et al., 2009a).

More broadly, although recent changes in substance use in adolescence are documented, few studies have monitored trends in young adults (Merline et al., 2004;Patton et al., 2007;Perkonigg et al., 2008) and there is need to update knowledge on this risk prone segment of the population. With notable exceptions (Merline et al., 2004;Patton et al., 2007), past studies which report on the relationship between socioeconomic position and substance use studied one substance at a time (Fagan et al., 2005;Perkonigg et al., 2008;Schulenberg et al., 1996;Schulenberg et al., 2005;Swift et al., 2008) or overall symptoms of abuse (Barrett and Turner, 2006), making it difficult to make cross-substance comparisons.

In this investigation, we use data from the TEMPO study, a cohort of young adults age 22 to 35 in 2009, to examine the regular use or abuse of psychoactive substances (tobacco, alcohol, cannabis, polysubstance) in relation to socioeconomic position, measured through individuals' educational and employment situation. Our

hypothesis is that young adults with low socioeconomic position have disproportionately high levels of psychoactive substance use. Based on evidence that any illegal drug use bears health and social risks (Huas et al., 2008), we also study past 12-months consumption of cannabis and other illegal drugs. Analyses account for participants' familial and own juvenile characteristics which can predict socioeconomic position and substance abuse later in life (family socioeconomic background, parental history of tobacco and alcohol use, participants' psychological problems and academic difficulties while growing up) (Buu et al., 2009; Fothergill and Ensminger, 2006b), as well as participants' relationship and parenthood status in young adulthood (Merline et al., 2004;Staff et al., 2010). Data from this study add to current knowledge on factors associated with substance-related difficulties in young adults, especially with regard to workforce and family life characteristics.

2. Methods

Data for this study come from two sources: young adults participating in the TEMPO study (assessment in 2009) and their parents who participate in the GAZEL cohort study (yearly assessments of parents' health, health behaviors and living circumstances between 1989 and 2009) and who reported on their child back in 1991.

2.1 Sample characteristics

The TEMPO (Trajectoires Epidémiologiques en Population) study, based in France, was set up in 2009 to follow-up young adults (22-35 years) who had taken part in a study of children's psychological problems and access to mental health care in 1991 (see **Figure 1**). The original sample of children surveyed in 1991 was selected among 4-16 year olds whose parents participate in the GAZEL study. The GAZEL

study is an epidemiological cohort of 20,624 men and women set up in 1989 among employees of France's national gas and electricity company representing a variety of occupations (from manual worker to manager). Since study inception, participants are followed yearly via self-completed questionnaires. The initial sample of children (GAZEL Youth study) was selected to match key characteristics of children in France (number of children per family and occupational grade of head of household) (Fombonne and Vermeersch, 1997;Goldberg et al., 2007).

In 2009, we sent parents of youths who had taken part in the 1991 GAZEL Youth study a letter asking them to forward the TEMPO study questionnaire to their son/daughter. Of the 2,498 youths contacted, 16 had died since 1991 and 4 were too ill or disabled to answer. The overall response rate to the 2009 TEMPO questionnaire was 44.5% (n=1,103), which is comparable to response rates to other mental health surveys in France (Alonso et al., 2004). Leading reasons for non-participation were non-transmission of the questionnaire by the parent (34.8%) or the youth's lack of interest (28.5%). Non-participants were more likely to come from families that were divorced, had low socioeconomic background or in which the parents smoked tobacco or abstained from alcohol, and to be male. Participants and non-participants did not vary with regard to parental or own overall psychological characteristics. Overall unemployment rate, as well as patterns of tobacco, alcohol and cannabis use among TEMPO study members are comparable to those of young adults in the general population of France (unemployed: 7% in TEMPO vs. 10% in France (INSEE, 2009); regular smokers: 36.6% in TEMPO vs. 34.8% in France; binge drinking in preceding month: 16.1% in TEMPO vs. 18.9% France; cannabis use in preceding month: 23.4% in TEMPO vs. 24.3% in France) (Beck et al., 2006a). The

TEMPO study was approved by the French national committee for data protection (CNIL: Commission Nationale Informatique et Liberté).

2.2 Measures

Data for this analysis primarily come from the 2009 TEMPO study assessment; additionally, parents were the main source of information on their own characteristics (family income, tobacco and alcohol use were collected in yearly GAZEL study surveys between 1989 and 2009) and on participants' juvenile characteristics (externalizing and internalizing problems) which were assessed in 1991.

2.2.1 Tobacco, alcohol, cannabis and other illegal drug use

Past 12-months substance use was ascertained via a self-completed questionnaire. Tobacco use was measured by the following item: 'In the preceding 12 months, how many cigarettes did you smoke each day?'. Regular smoking was defined as >=1 cigarette per day. Alcohol-related problems were ascertained by the French version of the Alcohol Use Disorders Identification Test (AUDIT), a 10-item screening test developed by the World Health Organization to match DSM IV criteria for alcohol abuse and dependence, which has been validated against clinical diagnosis (Babor et al., 2007;Bohn et al., 1995;Melchior et al., 2010b). The AUDIT score ranges from 0 to 40; following published guidelines, a score of >=8 in men and >= 7 in women defined alcohol abuse, while a score >=20 was considered suggestive of alcohol dependence (we refer to 'alcohol abuse' from here onward). Cannabis use was ascertained by the following question: 'How many times have you used cannabis in the last 12 months?'. Cannabis use was defined as smoking on >=1 occasion. Problematic cannabis use was assessed by 7 questions adapted from the Cannabis

Abuse Screening Test (CAST), which aims to screen for harmful cannabis use (Legleye et al., 2010) (e.g. do you smoke cannabis in the morning before going to school or work? do you smoke cannabis when alone? do you find it difficult to spend a day without smoking cannabis? have you tried to decrease your use of cannabis but have failed to do so? have you driven a car or motor bike after smoking cannabis?). The CAST score ranges from 0 to 7 and following the test authors' recommendations, we defined cannabis abuse as a score of >=2. The use of illegal drugs other than cannabis (ecstasy, LSD, amphetamines, cocaine, solvents, heroin, and prescription medications) was ascertained by asking 'Have you used ecstasy? LSD? amphetamines? cocaine? solvents? heroin? prescription medications? at least once in the preceding 12 months?'. Due to low prevalences, we grouped all the above-mentioned substances in a single 'other illegal drug use' category. We defined polysubstance use as two out of 1) regular smoking, 2) alcohol abuse, or 3) problematic cannabis use (Choquet et al., 2004). In additional analyses, we also examined age at first tobacco and cannabis experimentation, treated as continuous variables. For the sake of simplicity, throughout the text, we refer to participants' substance use.

2.2.2 Socioeconomic position (SEP)

Participants were asked to report their employment situation at the time of the study (student, in employment, unemployed, out of the labour force). To obtain an overall assessment of socioeconomic position (SEP) we combined educational attainment, occupational grade, past 12-months employment stability and past 12-months experience of unemployment, each coded 0-2 (Lynch and Kaplan, 2000;Poulton et al., 2002;Melchior et al., 2007). Correlations between the four components of our

socioeconomic indicator ranged from .03 to .47. To study associations between low SEP and substance use, we divided the SEP distribution at the bottom quartile (low vs. intermediate/high SEP).

2.2.3 Demographic characteristics

Participants' demographic characteristics included age in 2009 (studied as a continuous variable), relationship status (does not live with partner vs. lives with partner) and parenthood status (does not have children vs. has children).

2.2.4 Familial characteristics

Family data primarily come from parents' own reports in the GAZEL study. Family income was assessed in 1989 and dichotomized at the sample median of 1,981 euros/month (low vs. intermediate/high)(Melchior et al., 2010a). Parental tobacco smoking was assessed by yearly parental self-reports between 1989 and 2009 (smoker vs. non-smoker). To assess parental high alcohol use, we combined data from two sources: parents' own yearly self reports of high alcohol use (>=3 glasses of alcohol/per day for women, >=4 glasses of alcohol/per day for men) in the GAZEL study questionnaire, as well as TEMPO participants' reports of parental alcohol dependence, ascertained using a questionnaire adapted from the NIMH-FIGS (Maxwell, 1992) (high alcohol use present vs. absent).

2.2.5 Juvenile characteristics

Data on participants' juvenile psychological characteristics come from the 1991 GAZEL Youth study completed by the parents: internalizing and externalizing problems were assessed using the Child Behavioral Checklist (CBCL) (Achenbach,

1991;Fombonne and Vermeersch, 1997) and the presence of clinically significant symptoms was determined using the 85th percentile score (yes vs. no) (Amone-P'olak et al., 2009). Academic difficulties were assessed in 2009 by participant-reported grade retention on at least two occasions during schooling (yes vs. no). Participants with 30% or more missing data on parental longitudinal measures of substance use or psychological symptoms scales were excluded from the analyses.

2.3 Statistical methods

Our aim was to study the association between participants' socioeconomic characteristics and substance use, accounting for a) demographic factors and b) family and juvenile characteristics. First, we examined the prevalence of tobacco, alcohol, cannabis, other illegal drug and polysubstance use in relation to employment situation at the time of the study, using the chi-square statistic. Second, because our sample includes youths ages 22-35, some had not yet reached their highest academic level or were not in the labour force at the time of the study, making it difficult to measure their socioeconomic position. This led us to restrict our analyses to participants who were in the labour force (either employed or seeking employment). Although socioeconomic and substance use patterns vary by sex, among participants who were in the labour force, we found no statistically significant interactions between socioeconomic position and sex (p-values: tobacco smoking: 0.51, alcohol abuse: 0.71, cannabis use: 0.46, problematic cannabis use: 0.53, use of other illegal drugs: 0.26, polysubstance use: 0.43), therefore analyses were conducted in men and women combined. We studied associations between socioeconomic position and all factors potentially associated with substance use in a logistic regression framework, systematically adjusting for age and sex as well as all

covariates associated with substance use at a p<=0.10 statistical significance level. Data were analyzed using SAS V9 (SAS Institute, 2006).

3. Results

3.1 TEMPO participants' characteristics

Table 1 presents study participants' characteristics according to sex. Past 12-months prevalence of substance use was as follows: regular tobacco smoking: 35.8%, alcohol abuse: 14.3%, cannabis use: 22.6%, problematic cannabis use: 6.3%, use of other illegal drugs: 4.1%, polysubstance use: 12.4%. Men were systematically more likely to use psychoactive substances, except illegal drugs other than cannabis. Among participants with polysubstance abuse, 23.8% regularly used tobacco and abused alcohol, 50.1% regularly used tobacco and had problematic cannabis use, 2.3% abused alcohol and had problematic cannabis use, and 23.8% used all three substances.

3.2 Employment status and substance use

The full distributions of substance use in relation to employment status in men and women are shown in **Figures 1** and **2**. In men (**Figure 1)**, with the exception of tobacco smoking, students, the unemployed and participants who were not in the labour force systematically had a higher prevalence of substance use than the employed. Notably, students had the highest prevalence of alcohol abuse (40.5% as compared with 23.1% in other groups). In women (**Figure 2**), due to a low prevalence, associations between employment status and substance use did not reach statistical significance. However, graphically, levels of substance use among students were low or comparable to the employed; as in men, women who were unemployed seemed to have a high prevalence of substance use (except cannabis).

3.3 Socioeconomic position and substance use among individuals on the labour market

Table 2 presents results of age and sex-adjusted analyses conducted among participants who were in the labour force at the time of the study. With the exception of alcohol abuse, participants with low SEP were more likely to use psychoactive substances than those who had intermediate/high SEP (age and sex-adjusted ORs: tobacco smoking: 2.11, 95% CI 1.51-2.96; cannabis use: 1.75, 95% 1.20-2.55; problematic cannabis use: 2.44, 95% CI 1.38-4.30; other illegal drugs: 2.27, 95% CI 1.11-4.65; polysubstance use: 1.91, 95% CI 1.22-3.00). Further analyses revealed that low SEP was most strongly associated with concomitant regular tobacco use and problematic cannabis use (age and sex-adjusted OR: 2.25, 95% CI 1.25-4.05). Additionally, except for alcohol abuse, associations between SEP and substance use were gradient-like, that is the likelihood of substance use increased progressively as SEP decreased (not shown). Substance use levels were also high among participants who were younger (tobacco, alcohol, cannabis, polysubstance), male (alcohol, cannabis, polysubstance), did not live with a partner (all substances), did not have children (alcohol, cannabis, polysubstance), were from a family where the parents had divorced (tobacco, cannabis), had a parental history of tobacco smoking (tobacco, polysubstance), a parental history of high alcohol use (tobacco), had had juvenile externalizing problems (tobacco, cannabis), or had experienced academic difficulties (tobacco, cannabis, polysubstance). Although family income was associated with participants' SEP (sex and age-adjusted OR of low SEP associated with low family income: 1.78, 95% CI 1.26-2.51), we found no direct association with substance use. In further analyses, SEP was associated with a lower age at first cannabis but not tobacco experimentation (respectively, average age at first

experimentation in participants with low vs. intermediate/high SEP: cannabis: 17.2 vs. 18.0 years, p-value= 0.01; tobacco: 15.5 vs. 15.7 years, p-value= 0.16) and predicted past-year cocaine use (age and sex-adjusted OR associated with low SEP: 4.78, 95% CI 1.68-13.62). Examining components of the SEP score individually, tobacco smoking, cannabis use and problematic cannabis use were most strongly associated with low occupational grade and unstable employment while other illegal drug use occurred disproportionately among participants who were unemployed (not shown). Educational achievement was associated with higher odds of tobacco smoking (age and sex-adjusted OR for no high school degree vs. high school degree or above: 1.88, 95% CI 1.37-2.57), use of illegal drugs other than cannabis (age and sex-adjusted OR for no high school degree vs. high school degree or above: 1.93, 95% CI 0.98-3.81) and polysubstance use (age and sex-adjusted OR for no high school degree vs. high school degree or above: 1.62, 95% CI 1.05-2.50), but not alcohol or cannabis use.

As shown in **Table 3**, in multivariate regression models, ORs of substance use associated with low SEP decreased but remained statistically significant for tobacco smoking (multivariate OR: 1.80, 95% CI 1.25-2.59), cannabis use (multivariate OR: 1.53, 95% CI 1.00-2.34), problematic cannabis use (multivariate OR: 2.38, 95% CI 1.31-4.32) and polysubstance use (multivariate OR: 1.79, 95% CI 1.10-2.91). The multivariate OR associated with use of illegal drugs other than cannabis was also high but fell short of statistical significance (multivariate OR: 2.03, 95% CI 0.98-4.18). In supplementary analyses, SEP remained associated with substance use when we simultaneously controlled for all potential adjustment variables (ORs associated with low SEP respectively: tobacco smoking: 1.93, 95% CI 1.32-2.82; cannabis use: 1.49, 95% CI 0.97-2.30; problematic cannabis use: 2.30, 95% CI 1.21-4.37; other illegal

drugs: 1.30, 95% CI 0.52-3.21; polysubstance use: 1. 86, 95% CI 1.11-3.11) (not shown).

4. Discussion

4.1 Main findings

In a community sample of French young adults, 35.8% regularly smoked tobacco, 14.3% showed signs of alcohol abuse, 22.6% used cannabis, 6.3% showed signs of problematic cannabis use, and 12.4% used at least two psychoactive substances. Tobacco smoking, cannabis or other illegal drugs use, as well as polysubstance use, disproportionately occurred among individuals with low socioeconomic position, even after accounting for demographic characteristics, familial substance use, and past psychological and academic difficulties. The use of illegal drugs, especially cannabis, has disseminated in recent decades and views on substance use in the labour force and in the general population may be less negative than previously, contributing to changing norms. Our findings suggest that efforts aiming to decrease substance use and associated harms in the population should address a broad range of psychoactive substances and target students as well as young workers.

4.2 Strengths and limitations

Our study's main strengths are a) a community sample of young adults, who are often difficult to survey, b) longitudinal measures of family and juvenile characteristics which were obtained independently of participants' reports of substance use, c) study of several psychoactive substances in a single population, enabling cross-substance comparisons. We also need to acknowledge several limitations. First, we studied young adults whose parents worked in a large national company and were part of an

ongoing epidemiological study. Although our study sample was originally selected to match the socio-demographic and family characteristics of French youths, as in other epidemiological cohort studies, non-participation was higher in individuals from disadvantaged backgrounds. Nevertheless, overall employment characteristics, as well as the prevalence of tobacco, alcohol and cannabis use in our study are similar to recent national estimates in France (Beck et al., 2006;INSEE, 2009); therefore the association between socioeconomic position and substance use which we report should hold in other settings. Still, in the population at large, socioeconomic inequalities with regard to substance use in young adulthood are probably wider than we report. Second, socioeconomic position and substance use were assessed concomitantly, and the direction of their association cannot be established. This lead us to account for factors which simultaneously cause low socioeconomic position and substance use, including family income, parental substance use, youths' juvenile psychological problems and academic difficulties. Yet although parental substance use and juvenile behavioral or school problems predicted later substance use, neither intergenerational transmission nor early life difficulties explained socioeconomic inequalities with regard to substance use in young adulthood. Other studies have shown that youths from single-parent families are especially vulnerable to substance use (Barrett and Turner, 2006); however, we were not able to control for this family characteristic. Third, we did not control for peer characteristics which can be associated with youths' substance use (Barrett and Turner, 2006). However, by controlling for psychological and academic difficulties early on as well as for family status in young adulthood we probably accounted for most variability due to peer influences at different stages of lifecourse. Fourth, due to low numbers, we had limited statistical power to study rare phenomena such as the use of specific illegal

drugs other than cannabis. Other studies, based on larger samples, will need to examine associations between socioeconomic factors and the use of these substances in the community.

4.3 Socioeconomic position and different aspects of substance use

In our study, associations between socioeconomic characteristics and substance use varied by substance. Alcohol abuse was especially prevalent in male students, which is consistent with reports from other countries in Europe, North America, South America, and Australasia (Karam et al., 2007). In France, traditionally high levels of alcohol use have decreased in recent years (Legleye and Beck, 2006); however during the same time alcohol abuse in young people has become more frequent (Choquet et al., 2004). In our study, individuals who were unemployed had higher levels of alcohol abuse than those who were employed, but there was no systematic pattern in relation to socioeconomic position. Across industrialized countries, alcohol is the second leading psychoactive drug after tobacco, and our findings suggest that interventions that target alcohol abuse early on should be a public health priority (Karam et al., 2007). Overall, associations between low socioeconomic position and cannabis and other illegal drugs in the TEMPO study were comparable to what has been reported from other countries; for tobacco smoking socioeconomic inequalities were somewhat weaker than reported from American data (Merline et al., 2004;Perkonigg et al., 2008).

Associations between socioeconomic position in young adulthood and substance use may reflect both selection and causation phenomena. First, substance use in adolescence can predict lower educational attainment and job integration later on. Consistent with this hypothesis, we found that participants with low

socioeconomic position generally initiated substance use at a younger age than those with high socioeconomic position. Additionally, low educational achievement predicted tobacco, illegal drugs other than cannabis and polysubstance use. Yet associations between socioeconomic position and substance use (except alcohol) were not entirely explained by early life difficulties, implying that such health-related selection is not the whole explanation. Socioeconomic position may also directly influence substance use through pathways such as a) poor social integration and weak ties to others in society (Green et al., 2010), b) permissive norms surrounding substance use (Frone and Brown, 2010) and c) stress resulting from unstable employment, poor work conditions and financial difficulties (Frone, 2008;Mulia et al., 2008;Peretti-Watel et al., 2009b). Additional longitudinal data are needed to test whether changes in employment and living conditions can induce changes in substance use patterns in the short and the long-term.

4.4 Young adults' socioeconomic position

Measuring the socioeconomic position of young adults who are transitioning between schooling and employment is challenging (Hanson and Chen, 2007). In France, as in other countries, young adults are a heterogeneous population of students, workers and homemakers who face unemployment and job insecurity at higher rates than the rest of the population (INSEE, 2006). In order to address this issue, we used a composite indicator of socioeconomic circumstances based on educational attainment and employment characteristics; another interesting way of measuring youths' socioeconomic position is to assess perceptions of social standing in relation to family or peers (Hanson and Chen, 2007). Importantly, our detailed analyses suggest that substance use is less strongly associated with participants' early life

socioeconomic indicators (parental income and own educational attainment) than their own employment characteristics. Moreover, levels of substance use are systematically lower in participants who live with a partner and have children (Esbensen and Elliott, 1994;Ragan and Beaver, 2010). Thus, in young adults, concurrent socioeconomic position and family status appear to be relevant markers of the risk of substance use, even after accounting for demographic, familial and juvenile characteristics associated with increased vulnerability.

5. Conclusion

Tobacco smoking, alcohol, cannabis and polysubstance use are common behaviors among young adults, particularly those experiencing socioeconomic disadvantage. Compared to other groups of the population, individuals in their 20s and 30s are disproportionately likely to experience unfavourable employment characteristics and these may contribute to high levels of substance use. Socioeconomic disparities with regard to addictive behaviours which can be observed in young adulthood are likely to deepen over time and interventions that aim to decrease the burden of substance use in the population should focus on youths.

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Figure legends.

Figure 1. Flow-chart showing the selection of TEMPO study participants.

Figure 2. Preceding 12-months psychoactive substance use according to current situation in 2009-2010 among men of the TEMPO study (age: 22-35 years, n=451)

Figure 2. Preceding 12-months psychoactive substance use according to current situation in 2009-2010 among women of the TEMPO study (age: 22-35 years, n=646)

Table 1. Socioeconomic, demographic, familial, childhood and past 12-months substance use characteristics of TEMPO study participants (2009-2010, prevalence, %, 95% CI, p-value).

	Total n=1103 % (95%CI)/ mean (sd)	**Men** n=454 % (95%CI)/ mean (sd)	**Women** n=649 % (95%CI)/ mean (sd)	Women vs. men p-value
SOCIOECONOMIC POSITION (age range 22-35 years):				
High/intermediate	75.5 (72.9-78.1)	71.3 (67.0-75.6)	78.5 (75.2-81.8)	0.008
Low	24.5 (21.9-27.1)	28.7 (24.4-33.0)	21.6 (18.3-24.9)	
DEMOGRAPHIC CHARACTERISTICS				
Age (range : 22-35 years)	28.9 (3.7)	29.0 (3.6)	28.9 (3.7)	0.48
Family situation (age range : 22-35 years):				
Lives with partner	58.8 (55.9-61.7)	51.7 (47.0-56.4)	63.7 (60.0-67.4)	<0.0001
Does not live with a partner	41.2 (38.3-44.1)	48.3 (43.6-53.0)	36.3 (32.6-40.0)	
Parenthood (age range : 22-35 years): Has children	32.6 (29.8-35.4)	25.5 (21.4-29.6)	37.5 (33.7-41.3)	<0.0001
Does not have children	67.4 (64.6-70.2)	74.5 (70.4-78.6)	62.5 (58.7-66.3)	
FAMILY/JUVENILE CHARACTERISTICS				
Family income in childhood (age range : 2-15 years):				
Intermediate/high	65.2 (62.3-68.1)	66.0 (61.6-70.4)	64.6 (60.9-68.3)	0.64
Low	34.8 (31.9-37.7)	34.0 (29.6-38.4)	35.4 (31.7-39.1)	
Parental divorce (age range : 2-35 years): No	85.2 (83.0-87.4)	84.4 (81.0-87.8)	85.8 (83.0-88.6)	
Yes	14.8 (12.6-17.0)	15.6 (12.2-19.0)	14.2 (11.4-17.0)	0.52
Parental tobacco use (age range : 2-35 years): Non-smoker	68.8 (66.0-71.6)	68.6 (64.3-72.9)	68.9 (65.3-72.5)	0.92
Smoker	31.2 (28.4-34.0)	31.4 (27.1-35.7)	31.1 (27.5-34.7)	
Parental high alcohol use (age range : 5-35 years): No	77.0 (74.5-79.5)	75.4 (71.4-79.4)	78.1 (74.9-81.3)	0.30
Yes	23.0 (20.5-25.5)	24.6 (20.6-28.6)	21.9 (18.7-25.1)	
Juvenile externalizing problems (age range : 2-15 years): No	88.2 (86.3-90.1)	84.4 (81.0-87.8)	90.8 (88.6-93.0)	0.001
Yes	11.8 (9.9-13.7)	15.6 (12.2-19.0)	9.2 (7.0-11.4)	
Juvenile internalizing problems (age range : 2-15 years): No	84.9 (82.8-87.0)	87.4 (84.3-90.5)	83.2 (80.3-86.1)	
Yes	15.1 (13.0-17.2)	12.6 (9.5-15.7)	16.9 (14.0-19.8)	0.06
Academic difficulties (up to secondary school): No	70.3 (67.6-73.0)	61.9 (57.4-66.4)	76.1 (72.8-79.4)	
Yes	29.7 (27.0-32.4)	38.1 (33.6-42.6)	23.9 (20.6-27.2)	<0.0001
SUBSTANCE USE CHARACTERISTICS (age range : 22-35 years)				
Tobacco smoking	35.8 (32.9-38.7)	39.9 (35.3-44.5)	33.0 (29.3-36.7)	0.02
Alcohol abuse	14.3 (12.2-16.4)	21.4 (17.6-25.2)	9.3 (7.0-11.6)	<0.0001
Cannabis use	22.6 (20.1-25.1)	27.8 (23.6-32.0)	19.0 (15.9-22.1)	0.0008
Problematic cannabis use	6.3 (4.8-7.8)	9.5 (6.8-12.2)	4.1 (2.6-5.6)	0.0003
Other illegal drug use	4.1 (2.9-5.3)	4.8 (2.8-6.8)	3.6 (2.2-5.0)	0.34
Polysubstance use[1]	12.4 (10.4-14.4)	18.6 (14.9-22.3)	8.1 (6.0-10.2)	<0.0001

[1] Polysubstance use is defined as regular tobacco+alcohol abuse, regular tobacco+problematic cannabis use, alcohol abuse+problematic cannabis use, or regular tobacco+alcohol abuse+problematic cannabis use.

Table 2. Socioeconomic, demographic, familial and childhood characteristics and past 12-month substance use (TEMPO study, 22-35 years in 2009-2010, age and sex - adjusted ORs, 95% CI, p-value).

	Tobacco smoking (n=956/351 cases) OR, 95% CI, p-value	Alcohol abuse (n=965/133 cases) OR, 95% CI, p-value	Cannabis use (n=944/205 cases) OR, 95% CI, p-value	Problematic cannabis use (n=961/63 cases) OR, 95% CI, p-value	Other illegal drug use (n=959/40 cases) OR, 95% CI, p-value	Polysubstance use[1] (n=933/116 cases) OR, 95% CI, p-value
SOCIOECONOMIC POSITION: High/intermediate	1	1	1	1	1	1
Low	2.11 (1.51-2.96) p<.0001	1.06 (0.67-1.68) p=0.80	1.75 (1.20-2.55) p=0.004	2.44 (1.38-4.30) p=0.002	2.27 (1.11-4.65) p=0.02	1.91 (1.22-3.00) p=0.01
DEMOGRAPHIC CHARACTERISTICS						
Age (per 1 year):	0.95 (0.92-0.99) p=0.01	0.91 (0.86-0.96) p=0.001	0.92 (0.88-0.97) p=0.001	0.91 (0.84-0.98) p=0.01	0.98 (0.89-1.07) p=0.61	0.90 (0.85-0.95) p=0.0003
Sex[2]: Female	1	1	1	1	1	1
Male	1.28 (0.98-1.68) p=0.07	2.40 (1.64-3.49) p<0.0001	1.55 (1.13-2.12) p=0.01	2.13 (1.26-3.58) p=0.005	1.16 (0.62-2.20) p=0.64	2.31 (1.55-3.44) p<0.0001
Family situation: Lives with partner	1	1	1	1	1	1
Does not live with partner	1.83 (1.38-2.44) p<0.0001	2.53 (1.69-3.79) p<0.0001	2.07 (1.48-2.89) p<0.0001	3.85 (2.09-7.06) p<0.0001	3.53 (1.78-7.02) p=0.0003	3.54 (2.27-5.52) p<0.0001
Parenthood: Has children	1	1	1	1	1	1
Does not have children	1.20 (0.87-1.66) p=0.27	2.46 (1.44-4.21) p=0.001	1.78 (1.17-2.69) p=0.01	1.24 (0.61-2.54) p=0.56	1.16 (0.53-2.55) p=0.71	1.82 (1.04-3.20) p=0.04
FAMILY/JUVENILE CHARACTERISTICS						
Family income: Intermediate/high	1	1	1	1	1	1
Low	1.06 (0.80-1.41) p=0.67	0.99 (0.66-1.48) p=0.95	0.74 (0.52-1.03) p=0.08	0.66 (0.36-1.19) p=0.16	0.95 (0.48-1.89) p=0.88	0.82 (0.53-1.28) p=0.39
Parental divorce: No	1	1	1	1	1	1
Yes	1.58 (1.09-2.29) p=0.02	0.92 (0.54-1.60) p=0.78	1.54 (1.01-2.36) p=0.05	1.63 (0.85-3.12) p=0.14	1.20 (0.49-2.94) p=0.70	1.25 (0.72-2.15) p=0.43
Parental tobacco use: Non-smoker	1	1	1	1	1	1
Smoker	1.45 (1.09-1.93) p=0.01	1.21 (0.80-1.81) p=0.36	0.98 (0.70-1.39) p=0.92	1.37 (0.80-2.36) p=0.26	1.06 (0.53-2.15) p=0.86	1.42 (0.94-2.17) p=0.10
Parental high alcohol use: No	1	1	1	1	1	1
Yes	1.34 (0.99-1.82) p=0.06	0.96 (0.62-1.49) p=0.85	1.17 (0.81-1.68) p=0.40	1.09 (0.60-1.98) p=0.77	1.60 (0.81-3.17) p=0.18	0.96 (0.60-1.53) p=0.86
Juvenile externalizing problems: No	1	1	1	1	1	1
Yes	2.03 (1.35-3.05) p=0.001	0.97 (0.55-1.70) p=0.90	1.42 (0.90-2.25) p=0.13	1.46 (0.73-2.93) p=0.22	1.67 (0.71-3.90) p=0.24	1.26 (0.72-2.22) p=0.42
Juvenile internalizing problems: No	1	1	1	1	1	1
Yes	1.12 (0.78-1.63) p=0.54	0.72 (0.39-1.30) p=0.27	1.41 (0.92-2.16) p=0.11	0.81 (0.36-1.83) p=0.61	1.48 (0.66-3.33) p=0.34	0.89 (0.49-1.62) p=0.70
Academic difficulties: No	1	1	1	1	1	1
Yes	1.61 (1.20-2.16) p=0.001	1.22 (0.81-1.82) p=0.34	1.35 (0.96-1.90) p=0.09	1.32 (0.75-2.29) p=0.33	1.49 (0.76-2.91) p=0.25	1.65 (1.08-2.52) p=0.02

1 Polysubstance use: regular tobacco+alcohol abuse, regular tobacco+problematic cannabis use, alcohol abuse +problematic cannabis use, or regular tobacco+alcohol abuse+problematic cannabis use

2 The OR associated with sex is adjusted for age.

Table 3. Socioeconomic, demographic, familial and childhood characteristics and past 12-month psychoactive substance use (Tempo study, 22-35 years in 2009-2010, multivariate ORs, 95% CI).

	Tobacco smoking (n=859/351 cases) OR, 95% CI	**Alcohol abuse** (n=913/133 cases) OR, 95% CI, p-value	**Cannabis use** (n=824/205 cases) OR, 95% CI	**Problematic cannabis use** (n=915/63 cases) OR, 95% CI	**Other illegal drug use** (n=913/40 cases) OR, 95% CI	**Polysubstance use**[1] (n=883/116 cases) OR, 95% CI
SOCIOECONOMIC POSITION: High/intermediate	1	1	1	1	1	1
Low	1.80 (1.25-2.59)	1.02 (0.63-1.65)	1.53 (1.00-2.34)	2.38 (1.31-4.32)	2.03 (0.98-4.18)	1.79 (1.10-2.91)
DEMOGRAPHIC CHARACTERISTICS						
Age (per 1 year):	0.99 (0.95-1.03)	0.97 (0.91-1.03)	0.97 (0.91-1.03)	0.98 (0.90-1.06)	1.04 (0.94-1.14)	0.95 (0.89-1.03)
Sex: Female	1	1	1	1	1	1
Male	0.92 (0.68-1.24)	1.95 (1.31-2.91)	1.21 (0.85-1.73)	1.64 (0.93-2.89)	0.86 (0.44-1.67)	1.62 (1.04-2.54)
Family situation: Lives with partner	1	1	1	1	1	1
Does not live with partner	1.79 (1.31-2.43)	2.15 (1.40-3.32)	1.48 (1.01-2.17)	3.55 (1.92-6.57)	3.24 (1.62-6.51)	2.89 (1.78-4.71)
Parenthood: Has children	-	1	1	-	-	1
Does not have children		1.79 (1.01-3.18)	1.49 (0.93-2.38)			1.20 (0.65-2.23)
FAMILIAL/CHILDHOOD CHARACTERISTICS						
Family income: Intermediate/high	-	-	1	-	-	-
Low			0.67 (0.46-0.99)			
Parental divorce: No	1	-	1	-	-	-
Yes	1.48 (1.00-2.20)		1.49 (0.94-2.37)			
Parental tobacco use: Non-smoker	1	-	-	-	-	1
Smoker	1.31 (0.96-1.79)					1.41 (0.90-2.21)
Parental high alcohol use: No	1	-	-	-	-	-
Yes	1.17 (0.84-1.64)					
Juvenile externalizing problems: No	1	-	-	-	-	-
Yes	1.73 (1.10-2.72)					
Academic difficulties: No	1	-	1	-	-	1
Yes	1.35 (0.97-1.88)		1.22 (0.83-1.81)			1.55 (0.97 -2.47)

[1] Polysubstance use: regular tobacco+alcohol abuse, regular tobacco+problematic cannabis use, alcohol abuse +problematic cannabis use, or regular tobacco+alcohol abuse+problematic cannabis use.

Figure 1

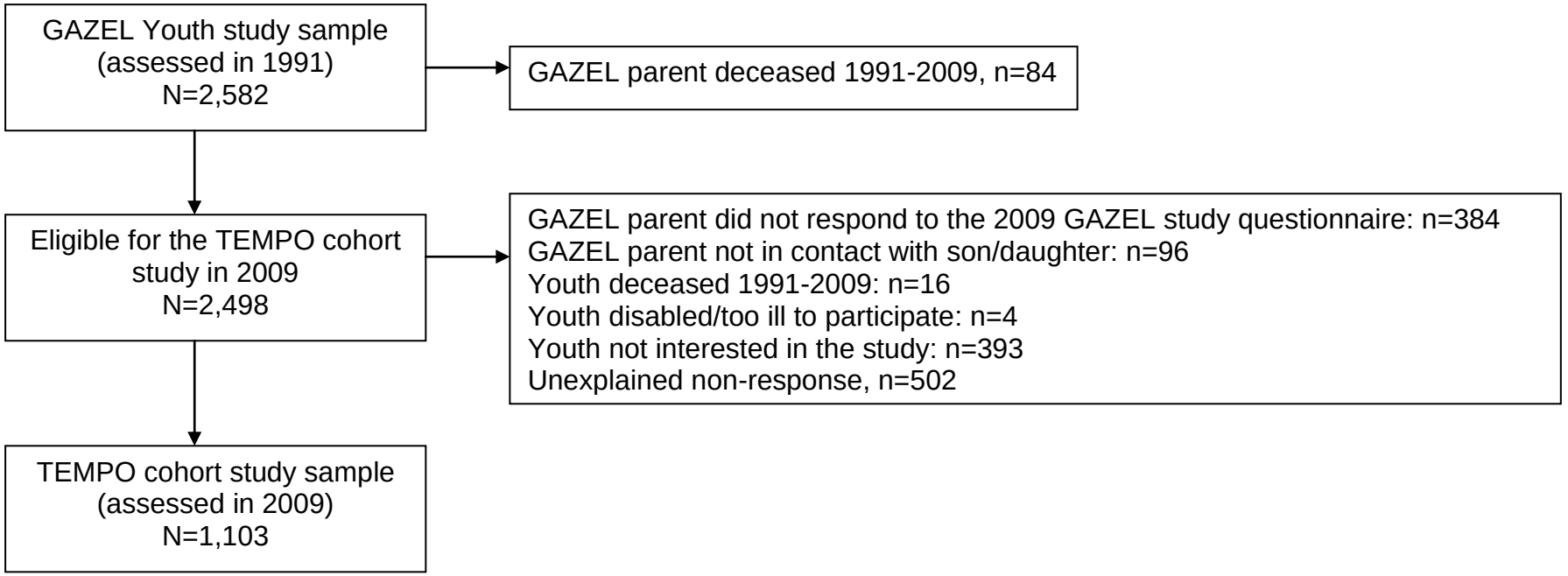

GAZEL Youth study sample
(assessed in 1991)
N=2,582
GAZEL parent deceased 1991-2009, n=84
Eligible for the TEMPO cohort
study in 2009
N=2,498
GAZEL parent did not respond to the 2009 GAZEL study questionnaire: n=384
GAZEL parent not in contact with son/daughter: n=96
Youth deceased 1991-2009: n=16
Youth disabled/too ill to participate: n=4
Youth not interested in the study: n=393
Unexplained non-response, n=502
TEMPO cohort study sample
(assessed in 2009)
N=1,103

Figure 2.

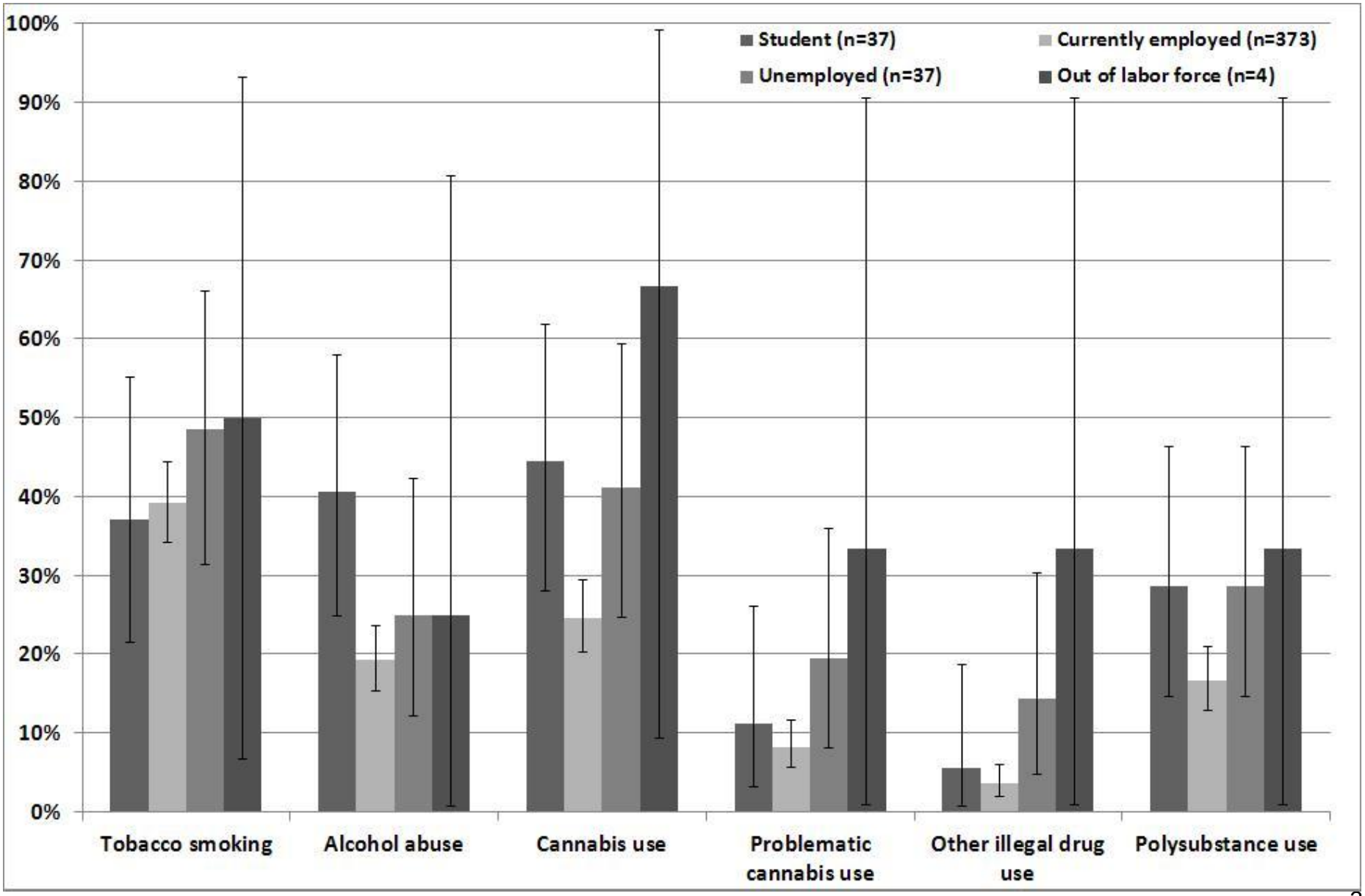
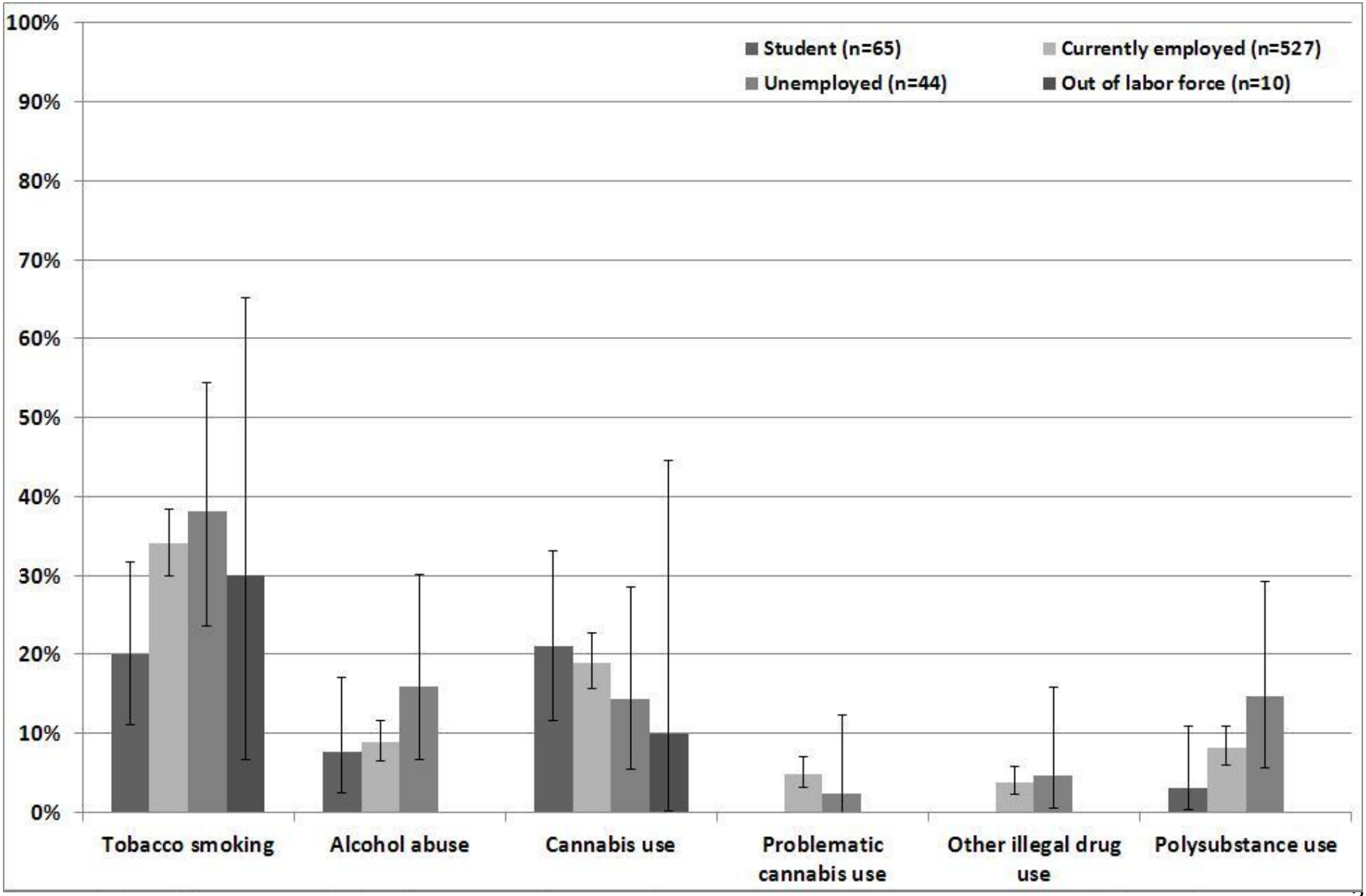

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Student (n=37)
Currently employed (n=373)
Unemployed (n=37)
Out of labor force (n=4)
Tobacco smoking
Alcohol abuse
Cannabis use
Problematic cannabis use
Other illegal drug use
Polysubstance use

Figure 3.


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Student (n=65)
Currently employed (n=527)
Unemployed (n=44)
Out of labor force (n=10)
Tobacco smoking
Alcohol abuse
Cannabis use
Problematic cannabis use
Other illegal drug use
Polysubstance use