

Unemployment and Substance Use: A Review of the Literature (1990-2010)

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Abstract: The current article summarizes the results of a comprehensive review of the international research published between 1990 and 2010. The research was focused on the prevalence of substance use/disorders among the unemployed and employed, the impact of substance abuse on unemployment and vice versa, the effect of unemployment on alcohol/drug addiction treatment and smoking cessation, and the relationship between business cycle, unemployment rate and substance use. Over hundred-thirty relevant studies were identified investigating these issues. The main results are as follows: (1) Risky alcohol consumption (associated with hazardous, binge, and heavy drinking) is more prevalent among the unemployed. They are also more likely to be smokers, to use illicit and prescription drugs, and to have alcohol and drug disorders (abuse, dependence). (2) Problematic substance use increases the likelihood of unemployment and decreases the chance of finding and holding down a job. (3) Unemployment is a significant risk factor for substance use and the subsequent development of substance use disorders. However, the current research provides only limited information about which individuals are more likely to be affected. (4) Unemployment increases the risk of relapse after alcohol and drug addiction treatment. (5) The exact nature of the relationship between unemployment and the probability of smoking cessation remains unclear due to the mixed results observed in the literature review. (6) Drinking and smoking patterns appear to be procyclical. We see a decrease in both when the economy declines and the unemployment rate increases. In contrast, a countercyclical trend was observed amongst adolescent drug users. However, these studies do not provide any convincing or additional information about substance use amongst the unemployed. This paper discusses the merits, limitations and problems of the research, proposes numerous future research questions, and outlines important implications for policy makers and practitioners, especially with regard to prevention and vocational promotion and rehabilitation.

Keywords: Unemployment, prevalence of substance use, risk of job loss, risk of substance use, addiction therapy, smoking cessation, vocational integration, business cycle.

1. INTRODUCTION

The relationship between unemployment and substance use continues to be an important point of discussion in both science and politics. Unemployment and alcohol use and their effects on morbidity and mortality were first recognized as interconnected phenomena during the industrial revolution in the 19th century [1]. At that time, two opposing views dominated the discussion. Some researchers believed that unemployment was to blame for the increasing rate of alcoholism. Other authors considered alcoholism to be a cause of unemployment. Until recently, no empirical evidence was available to support either one of these two rather speculative, opposing views.

Scientific research on this topic emerged in the 1980s. Two developments stimulated more interest in this area. Unemployment increased substantially in almost all Western industrial countries while addiction researchers became increasingly interested in social issues. Since then, we have observed a significant increase in the number of published international studies.

In addition, the foci of research have become broader. Initially, work focused on the relationship between alcoholism

and unemployment. Today, researchers no longer look at alcohol consumption alone. They also consider many other psychotropic substances in their research, including tobacco, illicit drugs, and even prescription drugs. More information is available now about the likelihood of substance use occurring in the context of unemployment. The causal relationship between substance use and unemployment continues to be an important feature of the research today.

Addiction treatment research provides a welcome addition to the previous work by focusing on the importance of unemployment in relation to therapy. This research was stimulated by a number of trends. As unemployment increased, so did the proportion of the unemployed who sought treatment for their alcohol or drug dependence issues. Working towards abstinence and reemployment with these patients became much more complicated under these conditions (see Section 6). Researchers also started to consider the relationship between the consumption of alcohol, tobacco, and illegal drugs and the business cycle/unemployment rate. Harvey Brenner [2-4] in the USA is one of the early and notable researchers associated with this line of enquiry (see Section 8).

Due to the large quantity of research published in the last twenty years, it is difficult to gain an overview of the current research situation. Previous written literature reviews covered only a fraction of the literature and are thus already outdated [5-6]. As a result, it is high time for a new literature review to summarize the current body of research.

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The present review tries to answer six specific questions:

(1) To what extent are substance use and substance disorders more or less prevalent among the unemployed than the employed? (2) To what extent does problem substance use increase the likelihood of unemployment and decrease the chances of employment? (3) To what extent is unemployment a risk factor for substance use and substance use disorders? (4) Does unemployment increase the risk of relapse after alcohol and drug addiction treatment? (5) Does unemployment reduce the probability of smoking cessation? (6) To what extent are patterns of alcohol, drug and tobacco consumption associated with increases or decreases in unemployment rates? Are these procyclical or counter-cyclical fluctuations? The review contains six sections to address each question. The implications for research and practice will be discussed at the end of each segment.

2. LITERATURE SEARCH

The author conducted an extensive literature search between June and August 2010 using the following electronic databases: Medline, Pubmed, Embase, Psyclit, Web of science, Google, Google scholar. The search covered all publications between 1990 and 2010. The keywords and related search terms were as follows: unemployment, job loss, unemployment rate, employment, business cycle, labor force outcome, each term combined with the following specific substance-related terms: alcohol (use, abuse, dependence), hazardous, binge, heavy drinking, alcohol-related mortality, illicit drugs (use, abuse, dependence), prescription drugs (medical, non-medical use), tobacco (smoking, nicotine dependence), relapse (therapy, rehabilitation), smoking, smoking cessation. Additional papers and population-based surveys were identified *via* citations in other reviewed papers. This process was repeated until no additional publications could be located. The final selection included some older papers that had not been peer-reviewed as well as a few unpublished manuscripts. Only publications in English or German were considered. Criteria for inclusion/exclusion will be listed in the individual sections devoted to each of the six main questions.

3. PREVALENCE OF SUBSTANCE USE AND SUBSTANCE USE DISORDERS AMONG UNEMPLOYED AND EMPLOYED

Epidemiologic cross-sectional studies assess and establish the prevalence rates of substance use and the sociodemographic characteristics of substance users. The rate of substance use among the unemployed *vs* the employed population has important implications for the identification of prevention and treatment needs. This section draws on studies that met the following selection criteria:

(a) They used representative population-based samples (that is, subjects were sampled from the whole country or a defined community); (b) The studies measured the prevalence rates and/or reported odds ratios (OR, logistic regression); (c) Employment was defined as paid employment and the unemployed sample contained no individuals not normally included in the labor force (retired,

disabled, students, homemakers, etc.); (d) The selected studies used specific guidelines to diagnose substance use disorders (e.g., DSM-III-R, DSM-IV, ICD-9 or ICD-10 [7], the Comprehensive International Diagnostic Interview (CIDI) [8], or the Diagnostic Interview Schedule (DIS) [9] or similar relevant diagnostic plans); (e) Studies on alcohol were limited to those that revealed problematic patterns of use (binge, heavy or hazardous drinking); (f) Studies on illicit drug use, prescription drug use, and smoking had to meet the first three criteria only (a-c). Using these criteria, 41 papers were identified (Table 1) representing different survey samples.

3.1. Results

Table 1 shows higher rates of substance abuse for the unemployed compared to the employed samples (except [43], see higher smoking rate among women). The unemployed are more likely to consume excessive amounts of alcohol, and to use illicit and prescription drugs. They are more likely to smoke and develop dependence on alcohol and illicit drugs.

Sex differences were observed in 15 studies (Table 1). Unemployed men have a higher rate of substance use than unemployed women (with two exceptions in relation to prescription drugs, see [13, 36]). While the difference in substance use between unemployed *vs* employed men was found to be largely significant across the studies, the results for unemployed *vs* employed women were less consistent.

Unemployed adolescents and young adults [17, 30, 34, 50] were also found to have a significantly higher rate of substance use compared to their employed counterparts (Table 1). Problematic behaviors include hazardous drinking [17], illicit drug use [34], cannabis dependence [30], and smoking [50].

Of those studies consulted, 33 utilized logistic regression (see OR, Table 1) that included covariates to control for various different confounding variables when assessing the significance of obtained differences observed in relation to unemployed *vs* employed samples. Potential covariates included factors which correlate with both employment status as well as substance use. These variables are age, gender, educational level, occupational status, income, marital status, race, ethnicity, rural/urban residence. Even when controlling for these variables, the differences between the two groups remained significant. This means that correlations exist between employment status and substance use/disorders which are not influenced by these control variables. Many of the selected studies did not, however, control for all potential covariates. Some studies controlled for age and gender [17, 20, 27, 41, 45, 50]. The majority did not account for socioeconomic status indicators such as income, occupational status or educational level. This is surprising, because socioeconomic status (SES) is known to be related to employment status, as well as smoking, and alcohol/drug abuse and dependence [27, 53-55]. The unemployed frequently have a lower SES which is also associated with significantly higher substance abuse rates.

Table 1. Prevalence of Substance Use/Abuse/Dependence Among Unemployed (U) and Employed (E), Prevalence Rates (%), Odds Ratios (OR)

Refs.	Data Source	N, Age	Substance Use/Abuse/Dependence	U (%)	E (%)	OR OR E=1
Binge, Heavy, Hazardous Alcohol Drinking						
[10]	Scotland HHS 1987	10.359 m age 40-59	Heavy drinking >8 units/day (>4 days/week) >14 units/day (>4 days/week)	9.8 2.2	4.1 *** 0.6 ***	
[11]	Netherlands LS-SEHD 1991	1.762 age 25-74	Heavy drinking (≥6 units on ≥3 days or ≥4 units on ≥5 days per week) (current drinkers)			3.5 ***
[12]	Netherlands GLOBE Study 1991	2.802 age 15-74	Hazardous drinking (men/women >21/14 units per week)			1.5 * m n.s. f
[13]	Germany NHS 1991/92	7.466 age 25-59	Binge drinking (men/women >80/60g alcohol on one occasion at least on one day per week)	12.8 m 4.9 f	6.3 m 4.0 f	2.1 ** 1.5 n.s.
[14]	Great Britain PMS 2000	8.580 age 16-74	Hazardous drinking (AUDIT score ≥8)	36.0	31.0	
[15]	France NHS 1991/92	4.440 m age 20-55	Hazardous drinking (≥4 units daily) (current drinkers)	42.0	30.0	1.7 **
[16]	Australia NDSHS 2007	23.356 age ≥14	Hazardous drinking (men/women >29/15 units per week)	16.0	12.1	
[17]	Finland FHS 2001/2	1.234 age 18-29	Hazardous drinking (men/women ≥280g/140g alcohol per week)	20.1 m 14.7 f	7.1 m 4.5 f	3.2 ** 3.6 **
[18]	USA BRFSS 2008	200.587 current drinkers, age ≥18	Binge drinking (past 30 days) Heavy drinking (past 30 days) Average number of binge episodes per person (past 30 days)	42.3 15.7 mean 2.2	31.9 * 10.0 * mean 1.3 *	
Alcohol Abuse/Harmful Use or Dependence (ICD-10/DSM-IV)						
[19]	USA NAS 1990	2.058 age ≥18	Alcohol dependence (DSM-IV)	13.2	3.7	3.7 *
[20]	Australia NSMHW 1997	10.641 age ≥18	Alcohol abuse/dependence (ICD-10)	12.7	7.8	1.7 **
[21]	USA NSDUH 1994-96	38.501 age 18-64	Alcohol dependence (DSM-IV)	8.0	5.0 *	
[22]	Great Britain PMS 1993	8.450 age 16-74	Moderate and severe alcohol dependence (criteria similar to ICD-10)	15.0	9.0	2.1 *
[23]	ESEMeD 2001/3	21.425 age ≥18	Alcohol abuse/dependence (DSM-IV)	3.2	1.0	3.2 *
[24]	Finland NHS 2000	6.005 age ≥30	Harmful alcohol use/dependence (ICD-10)	20.6 m 4.1 f	7.3 m 1.4 f	2.8 *** mf
Abuse/Harmful Use or Dependence on Alcohol, Illicit or Prescription Drugs (ICD-10/DSM-IV)						
[25, 26]	Australia NSMHW 1997	10.641 age ≥18	Harmful use/dependence of alcohol, cannabis, opioids, sedatives or stimulants (ICD-10)	19.0 m 11.0 f	9.0 m 4.0 f	1.8 * mf
[27]	Germany MHS 1999	4.181 age 18-65	Alcohol or illicit drug abuse/dependence (DSM-IV)	6.3	4.7	2.0 *
[28]	USA NSDUH 2009	67.500 age ≥18	Alcohol or illicit drug abuse/dependence (DSM-IV)	16.6	9.6 *	

(Table 1) contd.....

Refs.	Data Source	N, Age	Substance Use/Abuse/Dependence	U (%)	E (%)	OR OR E =1
Illicit Drug Use, Abuse/Harmful Use or Dependence (ICD-10/DSM-III-R/IV)						
[29]	Amsterdam Household Survey 1994	1.272 age ≥12	Use of cannabis during last month Unemployed < 2 years Unemployed > 2 years	12.0 15.9	8.1* 8.1*	
[30]	New Zealand DMHDS	992 age 21	Cannabis dependence (DSM-III-R)	20.4	8.7 ***	
[20]	Australia NSMHW 1997	10.641 age ≥18	Harmful drug use/dependence (ICD-10)	11.5	2.1	5.8 **
[31]	Australia NDSHS 1998	9.732 age ≥18	Use of injection drugs last 12 months			4.8 *
[32]	Australia NSMHW 1997	10.641 age ≥18	Cannabis dependence (DSM-IV)	8.3	2.0	1.7 *
[22, 33]	Great Britain PMS 1993	8.450 age 16-74	Drug dependence Dependence on cannabis only Dependence on other drugs than cannabis (criteria similar to ICD-10)	8.3 9.0 4.0	1.3 3.0 1.0	1.8 **
[14]	Great Britain PMS 2000	8.580 age 16-74	Dependence of any drug Dependence of cannabis (criteria similar to ICD-10)	14.0 9.0	4.0 3.0	2.3 ***
[16]	Australia NDSHS 2007	23.356 age ≥14	Recent drug use Recent drug use except cannabis Recent use of injection drugs	23.3 14.6 5.1	15.0 8.5 0.7	
[34]	France Health Barometer 2005	3.308 age 18-25	Cannabis use (at least 10 times per month) Drug use except cannabis (past year)	19.3 m 4.4 f 10.4 m 3.4 f	12.4 m 4.3 w 5.2 m 2.2 w	n.s. mf 1.9 *** mf
[28]	USA NSDUH 2009	67.500 age ≥18	Current drug use (past month)	17.0	8.0 *	
Use of Prescription Drugs						
[35]	Great Britain HALS 1987	9.003 age ≥18	Use of sedatives/tranquilizers (on day of interview)	4.5	1.4	3.2 ***
[36]	Sweden HPS 1984/85	4.094 age 18-64	Use of sedatives or hypnotics (at least 3 times per week)	9.5 m 12.0 f	2.5 m 1.2 f	7.4 ** 3.0 *
[37]	Italy population sample 1992/93	2.803 age ≥18	Use of benzodiazepines (past week) Use of benzodiazepines (daily for more than 6 months)	14.6 m 7.3 f 4.2 m 3.6 f	2.4 m 6.3 f 0.8 m 2.3 f	3.7 ** mf 3.8 ** mf
[38]	Australia NDSHS 1998	10.030 age ≥14	Nonmedical use of pain analgetics, tranquilizers/sleeping pills, barbiturates (past month)	12.1	5.9	
[13]	Germany NHS 1991/92	3.755 age 25-59	Use of sedatives, stimulants or pain relievers (at least ≥2 times per week)	10.8 m 15.4 f	4.8 m 10.3 f	2.7 * 1.6 *
[39]	ESEMeD 2001/3	21.425 age ≥18	Use of antidepressants, anxiolytics, antipsychotics or mood stabilizer (past year)	10.6	8.9	1.2 n.s.
[15]	France NHS 1991/92	4.440 m age 20-55	Use of hypnotics, tranquilizers, neuroleptics or antidepressants (at least once per week)	11.0	4.0	3.6 ***
[40]	USA NSDUH 2002-4	>200.000 age ≥18	Nonmedical use of any prescription drugs (past year)	12.5	6.1*	
[41]	Israel NHS 2003/04	4.859 age ≥21	Use of antidepressants, anxiolytics or hypnotics (past year)	5.2	3.5 n.s.	

(Table 1) contd.....

Refs.	Data Source	N, Age	Substance Use/Abuse/Dependence	U (%)	E (%)	OR OR E=1
Smoking						
[13]	Germany NHS 1991/92	7.466 age 25-59	Smoking (>10 cigarettes per day)	39.4 m 19.0 f	27.9 m 16.7 f	1.5 * 1.6 *
[42]	Ukraine NHS 2000	1.600 age ≥18	Current smoking	69.3 m 17.3 f	54.2 m 8.3 f	1.6 * 2.0 *
[14]	Great Britain PMS 2000	8.580 age 16-74	Current smoking	48.0	29.0	1.4 *
[15]	France NHS 1991-92	4.440 m age 20-55	Regular smoking Heavy smoking (>1 pack of cigarettes per day)	67.0 38.0	45.0 22.0	1.5 *** 1.7 ***
[43]	Portugal HNS 1999/00	1.644 age ≥18	Smoking	56.2 m 16.0 f	40.1 m 27.3 f	2.4 * n.s.
[44]	Sweden PHS 2000	5.180 age 18-64	Daily smoking	31.1 m 34.4 f	14.3 m 18.2 f	2.7 * 2.4 *
[45]	Germany NHS 2003	8.318 age 20-59	Regular smoking	60.5 m 48.4 f	42.2 m 37.1 f	1.9 ** 1.6 n.s.
[46]	Italy HDSS 2003	4.002 age ≥18	Daily smoking	42.8	25.1	2.8 ***
[47]	New Zealand 2006 Census	≥15	Regular smoking	36.5	22.6	
[16]	Australia NDSHS 2007	23.356 age ≥14	Smoking	38.2	21.7	
[48]	Europe SHARE 2004	11.462 age ≥50	Current smoking			1.7 *
[49]	Scotland SHS 2009	12.513 age ≥14	Smoking	51.0	24.0	
[28]	USA NSDUH 2009	67.500 age ≥18	Current cigarette smoking Current cigar smoking	41.9 10.0	25.6 * 5.9 *	
[50]	Germany NYSD 2008	3.001 age 12-25	Current smoking	59.7	37.4 **	
[51]	Europe TS 2009	30.292 age ≥15	Current smoking (U/manual workers) (U/white collars)	52.0 52.0	39.0 32.0	
[52]	Spain NHS 2006	31.300 age ≥16	Daily smoking	42.6 m 32.5 f	36.7 m 29.1 f	

BRFSS Behavioral Risk Factor Surveillance System, CPD: Census of Population and Dwellings, DMHDS: Dunedin Multidisciplinary Health and Development Study, ESEMeD: European Study of the Epidemiology of Mental Disorders: Belgium, France, Germany, Italy, Netherlands, Spain, FHS: Finnish Health 2000 Survey, HALS: Health and Lifestyle Survey, SHARE: Survey on Health and Ageing in Europe; Sweden, Denmark, Netherlands, Germany, Austria, Switzerland, France, Italy, Spain, Greece, HDSS: Health Determinants Surveillance System, HHS: Heart Health Study, HNS: Health and Nutrition Survey, HPS: Health of the Population Study in Stockholm County, MHS: Mental Health Supplement of the National Health Survey, NAS: National Alcohol Survey, NDSHS: National Drug Strategy Household Survey, NHS: National Health Survey, NSDUH: National Survey on Drug Use and Health, NSMHW: National Survey of Mental Health and Wellbeing, NYSD: National Youth Survey on Drug Use, PHS: Public Health Survey of Scania, PMS: Psychiatric Morbidity Survey, SHS: Scottish Household Survey, TS: Tobacco Survey of 27 Member States, AUDIT: Alcohol Use Disorders Identification Test [206], m: males, f: females, mf: males + females, * p<0.05, ** p<0.01, *** p<0.001.

This means the different prevalence rates for the unemployed compared to the employed may be a function of their different socioeconomic status.

The consumption of prescription drugs is more prevalent amongst the unemployed (Table 1). One explanation could be that the unemployed are more likely to be prescribed such drugs, specifically sedatives, anxiolytics, antidepressants and hypnotics, in response to their higher rates of mental disorders [24, 26, 27, 56]. Unfortunately, it is unclear from the present data to what extent the use of such prescription

drugs reflects medical use vs non-medical use. In addition, only the frequency was noted in these studies, but not the actual amount or dosage per intake. Therefore, it is currently difficult to assess to what extent the problematic use of prescription drugs is indeed more prevalent among the unemployed. Two studies at least suggest that this might be the case [38, 40].

Smoking is, by far, the most frequently reported problem for the unemployed (Table 1). Unemployed men and women are not just more likely to smoke more frequently, but also to

smoke greater quantities [13, 15]. These results suggest disproportionately high health and mortality risks for these individuals.

3.2. Discussion

The current research clearly demonstrates the following: Compared to the employed, the unemployed are more likely to be risky alcohol consumers and smokers, to use illicit and prescription drugs, and to have alcohol and drug use disorders (abuse, dependence). However, some of the results obtained in these studies vary widely (Table 1). This is not surprising given the different diagnostic schemes being used. One such example includes the ESEMeD study [23]. The authors reported comparatively low prevalence rates of alcohol abuse/dependence and suggested that this might have been the result of using more conservative definitions of alcohol disorders provided by the DSM-IV and an updated version of the CIDI. The rates for binge, heavy, and hazardous drinking are more difficult to compare since no standardized diagnostic scheme was used.

The different prevalence rates may also be the result of various definitions of unemployment (e.g., “currently without work” and/or “seeking work”). In many surveys, however, the authors omitted to define what they meant by “unemployed”. Different unemployment periods may explain the different rates as well (see Section 5). One study examined this potential moderating variable [25, 26]. The authors reported that the long-term unemployed had a higher prevalence of alcohol/drug disorders (ICD-10) than the short-term unemployed (OR 2.3 vs OR 1.8, controlled for age, gender, marital status and educational level) (also see [29], Table 1).

Other factors, such as sample characteristics, age differences, different assessment methodology and secular effects may also explain some of the variations in the prevalence rates.

Prevalence rates also seem to differ between countries, for a variety of reasons. We need to consider the influence of the diverse sociodemographic structure of the aggregate unemployment in different countries, the occurrence and frequency of long-term unemployment, the general prevalence rates for substance use disorders in the population [57], the potential accessibility of illicit drugs and prescription drugs, the costs associated with tobacco and alcohol, as well as the national policies regulating access and control of alcohol, tobacco and drugs. Generalizing the results from one country to another is therefore highly problematical. As a result, continuing with country-specific (and hence, population-specific) research seems to be crucial in the future.

The reported prevalence rates for the unemployed are likely to be underestimated due to the following issues:

- (a) In order to diagnose a substance use disorder, both the ICD-10 and the DSM-IV demand a review of substance use over a period of 12 months. A significant portion of the unemployed sampled in these studies may have been employed for at least part of the past 12 months. Similarly, some employed individuals may have been unemployed for at least

some weeks or months prior to finding reemployment just before taking the survey. As a result, we might underestimate substance use/disorders for those who are currently unemployed and overestimate the prevalence rates for those who are employed at the time of the survey. This problem is also likely to be a concern in all other studies, when the researchers asked participants about their substance use over a longer period of time.

- (b) It is easy to demonstrate that the percentage of unemployed participants completing health and substance use related surveys is disproportionately small. This is particularly the case for the less educated and the long-term unemployed [58, 59]. Surveys have shown that the unemployed individuals from these two groups are significantly more likely to smoke [45] and have substance use disorders [25, 26, 29].
- (c) Inpatients that are treated for alcohol or drug addiction are overwhelmingly unemployed [60-62] (also see Section 6). However, these individuals are excluded in the research.
- (d) Substance use is assessed *via* self-report in all studies. The unemployed may be more reluctant to give an accurate account of their substance use. Being unemployed, these individuals may be particularly fearful to admit to alcohol and illicit drug use as modern society tends to vilify these individuals even more. Hence, they underreport their actual substance use so as to avoid further stigmatization.

3.3. Implications for Research and Practice

The above sections listed a number of problematic research gaps pertaining to specific subgroups of the unemployed. An additional issue pertains to the practice of assessing employment status on a dichotomous scale. Today, we need to differentiate between full-time, part-time, and temporary and even the marginal employment (with the latter two categories facing particularly precarious work situations) [63]. Only very few studies differentiated between individuals who worked full-time and those who worked part-time [20, 21, 28, 33, 40]. These studies reveal that the prevalence rates of the part-time employed tends to be in the middle range, in-between the rates observed for the full-time and the unemployed.

We can draw the following conclusion based on the higher prevalence rates of the unemployed compared to the employed population: The unemployed are more likely to need substance-related prevention and therapy. Certain institutions maintain contact with the unemployed and are therefore ideally situated to assist. Such institutions include job centers and primary care services which may be ideal partners for brief interventions [64-66]. Prevention initiatives could be organized in cooperation with local alcohol/drug counselors and treatment services. These measures might include alcohol and drug screening, information about the risks associated with substance use, brief intervention and motivational interviewing (MI) [67] to encourage the unemployed with substance use disorders to seek addiction treatment. Such interventions will require job centre staff to

be trained accordingly. A few pilot projects are currently running in Germany, each designed to test and then evaluate the success of such job centre based approaches [68].

Please note that Table 1 does not list a number of population-based studies that examined comorbidity, specifically, the co-prevalence of both substance use disorders as well as other mental disorders such as mood, psychotic, and anxiety disorders (as defined by the DSM-IV or ICD-10). Hämäläinen *et al.* [69] noticed that the incidence of comorbidity between frequent alcohol intoxication and depression was significantly higher amongst the unemployed compared to the employed in Finland. This trend was even more pronounced for the long-term unemployed. Park [70] observed a similar pattern in the USA. Unemployed individuals with substance use disorders were significantly more likely to have at least one mental disorder than the employed comparison group. Coulthard *et al.* [14] in Great Britain reported the same comorbidity results for a group of unemployed drug addicts. In another British sample, Farrell *et al.* [71] also found significant differences in comorbidity for the unemployed vs employed groups. Compared to the employed the unemployed were twice as likely to have been diagnosed with at least one mental disorder while also suffering from substance dependence (alcohol, drug, and/or nicotine). These findings reiterate the earlier conclusion that the unemployed are more likely to require interventions. These treatments will need to be all encompassing and address the complex issues associated with both substance use dependence and mental disorders.

It is important to remember, as mentioned above, that the unemployed are not one homogeneous group. However, to date, very few studies provide an overview in which they compare and contrast prevalence rates amongst the unemployed according to the sociodemographic characteristics such as age, short-term and long-term unemployment, educational level, income, sex, and marital status. A quick review of Table 1 shows that only very few studies provide separate prevalence rates for men and women. Considering subgroup differences has relevant implications for the development of successful prevention and treatment plans. A Finnish population-based study [72] reported significant differences between the unemployed and employed in relation to hazardous alcohol use. However, these findings only applied to specific unemployed groups: men who were single and less-educated, and women who were single but highly qualified. More research is needed to clarify which unemployed subgroups are most likely to benefit from preventive interventions and treatment offers.

It is undeniable, that employment status provides important epidemiological information. As a result, it is strongly recommended that researchers routinely collect employment status and demographic information (such as age, gender, and SES) in all future surveys.

It is important to emphasize that the data in Table 1 do not allow for any causal conclusions. The table lists cross-sectional data. This, in essence, allows for two different interpretations: (a) the comparatively higher prevalence rates observed for the unemployed may be the result of unemployment increasing their subsequent risk of substance use and disorders (causation), or (b) substance abusers have greater difficulties to find and hold down a job (selection

respectively reverse causation). This will be discussed in detail in Sections 4 and 5.

3.4. Local Unemployment Rate and Prevalence of Substance Use

This section considers the results of a number of so-called ecological studies which analyze the potential correlation between substance use and local unemployment rates. The articles for this section were selected using the following two criteria: (a) the studies used community-specific unemployment rates and (b) surveyed a representative population-based community sample.

3.4.1. Results

The results of these studies paint a consistent picture, depicting a recurrent pattern between substance use and unemployment. Osler *et al.* [73] (Copenhagen/Denmark) found a positive correlation between smoking, drinking hazardous amounts of alcohol (>28 units/week) and the local unemployment rate. Öhlander *et al.* [74] (all areas in Sweden) and Karvonen *et al.* [75] (Helsinki/Finland) also observed a similar trend when correlating smoking with unemployment rates across different regions. Similar findings were obtained by Squires *et al.* [76] (Liverpool/Great Britain), Gascon and Spiller [77] (Kentucky/USA) and Quigley *et al.* [78] (Dublin/Ireland) in relation to illicit drug use (heroin, methadone, cocaine) and the consumption of prescription drugs.

3.4.2. Discussion

These ecological studies are not as readily interpretable in relation to unemployment, as the prevalence rate is not specific to individuals, but refers to regional populations consisting of various different subgroups: unemployed, employed, and persons out of work. This means interpretations based on these findings may lead to ecological fallacies. In addition, no causal conclusions can be drawn as the data are cross-sectional. The practical relevance of these studies pertains to the fact that they provide evidence that a high local unemployment rate indicates a high need for prevention and therapy. Local needs should therefore be considered when planning specific regional and communal services such as prevention initiatives, addiction counseling, and related treatment services.

4. TO WHAT EXTENT DOES PROBLEM SUBSTANCE USE INCREASE THE LIKELIHOOD OF UNEMPLOYMENT AND DECREASE CHANCES OF EMPLOYMENT?

It is well known that the consumption of psychotropic substances is associated with considerable economical losses. Lost productivity is one of the most substantial costs of substance use [79, 80]. In response to these concerns, researchers have become increasingly interested in how the consumption of alcohol, drugs, and tobacco affects different labor market outcomes, namely, unemployment, employment, working hours, wages, absenteeism, and so on. In this review the following selection criteria were used: (a) The studies investigated the outcomes of substance use on unemployment/employment. (b) The studies examined representative popu-

lation-based samples. (c) Employment was defined as paid employment and the unemployed sample contained no persons out of labor force. (d) The studies provided longitudinal data or cross-sectional data which were analyzed using econometric statistical methods (mostly by so called instrumental variables: IV-estimation). These methods provide a means to assess causal relationships. The IV-estimation is an econometric method that can eliminate biases due to reverse causality in cross-sectional analyses, as long as the estimation is based on testable or at least sufficiently plausible assumptions (for details see [81-83]). Longitudinal studies also have to consider the possibility of reverse causation. It is possible that a significant portion of surveyed participants experienced a period of unemployment prior to participating in the research, which then influenced their substance use patterns, causing subsequent job loss later on. As a result, this might potentially bias labor market outcomes. Three papers consider this in their statistical analyses (Table 2) [86, 92, 95]. The possibility of reverse causality could not be eliminated in the case of five other longitudinal studies [84, 85, 97, 98, 99] and hence they are excluded. (e) The selected studies controlled for confounding variables which also may influence the likelihood of unemployment and the chance of finding and holding down a job (such as age, gender, educational level, occupational status, marital status, race or ethnicity). 14 studies were located altogether that met these criteria. 11 of these came from the USA, while the remaining studies were published in Great Britain and Finland (Table 2).

4.1. Results

The findings in Table 2 provide evidence that abuse/dependence on alcohol and illicit drugs negatively affect labor market outcomes, e.g. problem substance use increases the risk of unemployment and decreases the chances of employment.

Therefore a significant portion of the differences in prevalence rates observed in Table 1 (Section 3) for the unemployed and employed may be assumed to be the result of selection. That is, problem substance users are disproportionately more likely to lose their job and to be unable to find paid employment later on.

Negative labor market trends were also observed in research conducted with adolescent and young adults and in later life as a result of using marijuana at an early age (Table 2) [82, 95, but see 89]. Furthermore, numerous studies have shown that chronic adolescent alcohol and drug use will negatively impact their educational attainment (e.g., it increases absenteeism, the risk of dropping out of school, and results in poor school performance). This may diminish their subsequent chances of finding employment [101-105]. These findings suggest that alcohol and drug prevention initiatives should also be targeted at school children and adolescents, so as to avert the potentially negative consequences of their substance use in later life.

The results of severe forms of substance abuse, such as heavy drinking, hard drug use, alcohol and drug dependence outlined in Table 2 are largely identical across the board. The effect sizes were substantial. For example, alcohol use

disorders (DSM-III) doubled the risk of shifting from employment to unemployment [86]. Drinkers who drank alcohol at high risk (see Table 2 [92]) were six times more likely not to be employed than at low risk drinkers. Employment probabilities were reduced 23-32 percent points by cocaine use and 15-17 points by marijuana use. The impact of cocaine use on job loss/employment exceeded that of marijuana by about 50%-100% [82].

However, the results of less severe forms of substance use (e.g., any alcohol or marijuana use during the past 12 months) appear to be either not significant or even contradictory (see Table 2). We may therefore assume that the selection effect may be quite pronounced in the reported prevalence rates (Table 1, Section 3) pertaining to severe substance use disorders, such as alcohol and drug abuse/dependence.

4.2. Discussion

These studies demonstrate, by controlling for confounds, that problematic substance use (e.g., alcohol or drug abuse/dependence, use of hard drugs) have a substantial negative effect on labor market outcomes (unemployment/employment).

Unfortunately, very few studies examine the underlying causes. Mijares [83] was able to show that the negative effects were not directly linked to cocaine use, but resulted from the cocaine-induced health issues which increased work absences and impaired productivity on the job. Other substance abuse/dependence, including other illicit drugs and alcohol, will undoubtedly also play a role in lowering productivity and increasing absenteeism. This may also apply to smoking [106]. Generally, we can assume that the effect of substance use on a user's physical and mental health depends on the severity of his or her substance use, producing varying effects on productivity, work performance, work absences, and other risk factors associated with unemployment.

The participation in deviant/criminal activities in the context of illicit drug buying and selling is also of great importance to the present discussion. The negative repercussions for future employment are understandably even more pronounced when this behavior results in convictions and incarceration. A Canadian study is particularly interesting in this context [107]. The authors examined employment patterns amongst injection drug users in a longitudinal cohort study using a large representative sample in Vancouver. They found that the following factors were significantly and negatively related to legal paid employment: users' HIV- and HCV-positive serostatus, daily heroin injection, public injection practices, daily crack use, recent incarceration, sex trade involvement and unstable housing.

Baldwin *et al.* [100] found that persons with former alcohol or drug abuse/dependence (DSM-IV) were more likely to lose their job due to job-related stigmatization (Table 2): Among persons with former disorders the job loss rate was 15%-23% higher than among persons without such disorders. This is particularly problematic for two reasons. Not only are these persons unfairly dismissed, but they may also be more likely to relapse in response to losing their jobs (see Section 6).

Table 2. Effects of Substance Use/Abuse/Dependence on Unemployment/Employment

Refs.	Data Source, N, Age	Substance Use Variables	Labor Market Outcomes	Effects
[86]	USA ECA 1981-1986, panel study, 4.075, age \bar{O} 39.3	Alcohol abuse/dependence (DSM-III) (lifetime)	Unemployment	Alcohol use disorders doubled the risk of shifting from employment to unemployment
[87]	USA NHIS 1988, 23.805, age 25-59	Alcohol abuse/dependence (DSM-III) Heavy drinking (past two weeks)	Employment Unemployment	For men and women heavy drinking and abuse/dependence increased unemployment and reduced employment
[88]	USA NHIS 1988, 9.822 men, age 25-59	Heavy drinking (past two weeks)	Employment Unemployment	Heavy drinking increased unemployment and reduced employment
[89]	USA ECA 1980-1984, 5.326, age 18-45 men	Illicit drug use with symptoms of abuse or dependence (lifetime)	Employment	For the 30-45 year-old cohort drug use reduced the probability of being employed, but no effect for the 18-29 year-old cohort
[90]	Great Britain BCS 1994+1996, 13.908, age 16-50	Use of soft drugs (cannabis, LSD etc.) Use of hard drugs (opiates, cocaine etc.)	Unemployment	Use of hard drugs increased the risk of unemployment for males and females, use of soft drugs had no effect
[91]	USA NHSDA 1997, 9.621, age 25-59	Chronic illicit drug use (\geq once per week past year)	Employment	Drug use was negatively related to employment for both genders, non-chronic drug use had no effect
[92]	USA cohort study, 658, age \geq 18	At risk drinking (\geq 7 units per drinking day, 85% met criteria for dependence DSM-IV)	Unemployment Duration of employment	At risk drinkers were more likely to be unemployed and to work fewer weeks
[82]	USA NLSY 1984, 1988, 2.810, 3.205, age 14-22 men	Any marijuana use Any cocaine use (past year)	Employment	Each drug use reduced the likelihood of employment, effect of cocaine use was 50%-100% larger than that of marijuana use
[83]	USA NHSDA 1988, 1.715, age 12-60 men	Any use of alcohol Any use of marijuana Any use of cocaine (last year)	Employment	Caused by the degrading health effect cocaine use had a negative effect on employment
[93]	Finland Health 2000 Survey, 4.751, age 30-65	Alcohol dependence (ICD-10)	Full-time employment	For both males and females alcohol dependence reduced probability of full-time employment
[94]	Great Britain HSE 1997, 1998, 6.644 men, age 22-64	Problem drinking: (a) CAGE, (b) physical alcohol-related symptoms, (c) drinking every day, (d) $>$ 45 units per week	Employment	All defined types of problem drinking led to a decline in the probability of employment
[95]	USA Woodlawn panel study, 530, age 32-33	Heavy marijuana use (\geq 20 times during adolescence)	Employment Unemployment	Heavy marijuana use in adolescence (use 20 or more times prior to age 17) increased the risk of being unemployed in later life for men, not for women
[96]	USA NLAES 1992, 22.107, age 24-59	Alcohol and drug abuse/dependence (DSM-IV)	Employment Part-/full-time blue collar, service sector, white collar	Alcohol and drug abuse/dependence reduced overall employment, decreased white collar employment and increased part-time employment
[100]	USA NESARC, 2001-2002, 25.349, age \geq 18	Alcohol or drug abuse/dependence (DSM-IV)	Employment Full-time employment Involuntary job loss	Persons with former alcohol or drug abuse/dependence had an increased risk of job loss, although they had not consumed alcohol or drugs during last year (job loss caused by job-related stigmatizing)

BCS: British Crime Survey, CHDS: Christchurch Health and Development Study, ECA: Epidemiologic Catchment Area Project, HSE: Health Survey of England, NESARC: National Epidemiologic Survey on Alcohol and Related Conditions, NHIS: Alcohol Supplement of the National Health Interview Survey, NHSDA: National Household Survey on Drug Abuse, NLAES: National Longitudinal Alcohol Epidemiological Survey, CAGE: Questionnaire [207].

There are a number of additional factors that are not currently being investigated, but which are probably also associated with substance abuse, with potentially negative consequences for employment and unemployment. These include repeated violations of workplace policies regulating

the use of alcohol, drugs, and tobacco on the job (e.g., intoxication while at work) as well as limited mobility due to driving licenses being confiscated in response to drug or alcohol abuse.

The unemployment risks are also likely to vary in response to the national and regional unemployment rates. During periods of high aggregate unemployment, many layoffs are the result of large scale closures of factories and entire departmental units rather than the result of employee-based evaluations of individual productivity, health and problem behaviors. Under these circumstances, substance users with severe disorders are not more likely to lose their job than users with moderate use patterns. This may not be the case when the unemployment rate is low.

4.3. Implications for Practice

The current research shows that there is a high need for interventions that focus on reducing problematic substance use in order to improve labor market outcomes. Therefore, alcohol and drug prevention initiatives at the workplace are a necessity. Apart from this, it would be meaningful and useful to implement appropriate measures at the workplace so as to prevent, if at all possible, the dismissal of employees with problematic substance use issues. As a rule, the dismissal of these individuals tends to result in high economic costs to the welfare system, especially when individuals end up being unemployed for a long time. That is why employers should encourage employees with problematic substance use issues (potentially using qualified in-house professionals such as social workers, health advisors, or even counselors associated with the company health insurance fund) to seek professional counseling and treatment at the workplace or within the community, an approach that at least larger companies have successfully adopted some times ago [108].

5. TO WHAT EXTENT IS UNEMPLOYMENT A RISK FACTOR FOR SUBSTANCE USE AND SUBSTANCE USE DISORDERS?

In principle, two different unemployment effects are feasible:

- (a) Unemployment increases substance use because of the increased distress associated with losing one's job. The psychosocial impact of unemployment has been documented for numerous years in the international literature [109]. Examples include financial strain, depression, identity crises, monotony, sleep disorders, and loss of social support. In adolescents, these psychosocial effects may disturb and block important developmental stages, such as the need to become more autonomous from one's parents and to consolidate and define one's identity.
- (b) On the other hand, unemployment can decrease the consumption of substances. This may be attributable to two different reasons. First, the decrease is the result of less income available to the unemployed with which to purchase alcohol, tobacco or drugs. Second, work-related strains may no longer play a role, thus reducing substance use.

The literature search resulted in the identification of 33 studies which focused on substance-related impact of job loss/unemployment. 20 studies (Table 3) were identified based on the following criteria: (a) Studies used a

longitudinal model or cross-sectional data that were analyzed using instrumental variables methods [81]; (b) The studies used representative population-based samples; (c) The measured effect of job loss/unemployment was controlled for relevant confounders (such as age, gender, education level, marital status) and for potential bias due to reverse causality. This means that in these studies, the researchers checked whether or not participants had any substance use issues before they became unemployed, and whether substance use was a causal factor leading to unemployment. Four papers based on plant closure studies [110-112, 146]. In these samples, the potential bias due to reverse causality is minimal as all individuals were made unemployed for one and the same reason.

13 studies were excluded due to the following reasons: (a) The sample consisted of patients using primary health care services [113], the sample was not representative of the population at large [114] or too small [115, 116]. (b) Two studies used inadequate diagnostic tools to diagnose substance abuse. One study classified participants as problem drinkers if they had, at least at one occasion, "drunk more alcohol than appropriate" [118]. In another study, problem drinking was based upon the participants recalling at least one incident of alcohol-induced health issues over the past year [119]. (c) Three studies combined unemployed individuals with persons out of labor force [120-122]. (d) And finally, the aforementioned studies as well as four other studies [117, 123-125] were excluded because they did not control for relevant confounders and/or reverse causality.

11 out of 20 studies listed in Table 3 came from the USA, four from Sweden, two from New Zealand and one each from Norway, Great Britain, and Austria.

5.1. Results

In respect to the type of substances researched in these studies, alcohol was the most common substance, followed by studies on smoking and illicit drugs, and only two studies investigated the use of prescription drugs.

The studies researched unemployment outcomes, including the deterioration of substance use patterns, the first occurrence of alcohol and drug use disorders, and even hospitalization due to alcohol-related conditions [146] and alcohol-related mortality [111].

All studies in Table 3 list at least one finding that demonstrates that job loss/unemployment significantly increases substance use and substance disorders. For example, becoming unemployed increased the chance of developing an alcohol-related disorder (abuse/dependence according to DSM-III) six fold compared to those who remained in employment [127]. Alcohol and illicit drug abuse/dependence rates also increased 1.4 to 4.1 times amongst young people after six months of unemployment compared to their employed peers [136]. Those who were unemployed in young adulthood were four times more likely to use cocaine or heroin [141]. The job losers who remained unemployed for longer reported smoking 7.1 more cigarettes respectively than individuals who did not experienced job

Table 3. Effects of Job Loss/Unemployment on Substance Use/Abuse/Dependence

Refs.	Data Source, N, Age	Outcome Measures	Effects
[86]	USA, ECA 1981-86, panel study, 8.278, age Ø 39.3	Alcohol abuse/dependence (DSM-III)	Those who lost their job and remained unemployed were nine times more likely to develop an alcohol disorder in relation to respondents remaining employed
[126]	Norway NSYP 1985-89, panel study, 1.997, age 17-20	Frequency/quantity of alcohol use Frequency of cannabis use	Unemployment had an increasing impact on frequency of cannabis use among men, but not among women, no impact on alcohol use
[127]	USA ECA 1981-86, panel study, 3.987, age Ø 38.3	Alcohol abuse/dependence (DSM-III)	Those becoming unemployed were over six times more likely to become alcoholically disordered relative to those remaining employed
[128]	Sweden 1981-86, panel study, 1.083, age 16-21	Alcohol consumption per year High consumption per day (men/women, >3.5/2.0 cl)	Level of alcohol consumption and number of high consumers increased among men (not among women) with long-term unemployment
[129]	Sweden 1981-86, panel study, 1.083, age 16-21	Current smoking Frequency of smoking	Long-term unemployment was associated with an increasing percentage of smokers and increasing of smoking frequency among men and women
[81]	USA NHIS 1988, 32.012, age 18-64	Average daily alcohol consumption Alcohol dependence (DSM-III)	Involuntary unemployment increased alcohol consumption in the overall sample, but reduced dependence symptoms among single respondents
[130]	New Zealand CHDS 1995-98, cohort study, 1.025, age 16-18	Nicotine dependence Alcohol abuse/dependence (DSM-IV) Drug abuse dependence (DSM- IV)	Increasing exposure to unemployment was associated with increasing risks of all outcomes
[131- 133]	USA NLSY 1984-89, panel study, 2.441, age 14-22	Alcohol abuse/dependence (DSM-III) Heavy drinking	Unemployment by job loss doubled the risk of alcohol disorders
[134]	Great Britain NCDS 1974-91, cohort study, 2.887 men, age 16-33	Current smoking Number of drinks per week Alcohol problem (CAGE)	Men who had experienced unemployment in the year prior to follow-up, compared to those who had not, were more likely to smoke, drink heavily and to have an alcohol problem
[135]	USA HRS 1977-2000, panel study, 7.541, age 51-61	Drinking participation Number of drinks per day	Involuntary job loser who did not consume alcohol at baseline were twice as likely as continuously employed to start with drinking, but job loss was not associated with number of daily drinks
[136]	New Zealand CHDS, cohort study, 1.053, age 16-21	Alcohol abuse/dependence (DSM-IV) Drug abuse/dependence (DSM- IV)	Increasing exposure to unemployment was associated with increasing risks of both outcomes
[111]	Sweden plant closure study 1987-88, 12.337 displaced, 146.687 non- displaced workers, age 25-64	Alcohol related mortality	Alcohol-related mortality increased among displaced men (not among women) during the first four years following job loss
[137]	USA MFS 1977-2000, cohort study, 7.541, age 35	Current smoking Heavy drinking Marijuana use past 30 days Cocaine use past year Misuse of prescription drugs past year	Adults with a recent history of unemployment were much more likely to smoke, use marijuana, use cocaine and misuse prescription drugs, but unemployment was no predictor of adult heavy drinking
[138]	USA HRS 1992-94, panel study, 3.052, age 51-61	Number of cigarettes per day	Continued unemployment was associated with an increase in cigarette consumption
[110]	Austria plant closure study 1998-2002, 732 displaced, over one million non-displaced workers, age 18-65	Prescriptions/purchases of psychotropic drugs (sedatives, benzodiazepines, antidepressants etc.)	After involuntary job loss prescriptions/purchases of psychotropic drugs significantly increased for males, but not for females

(Table 3) contd.....

Refs.	Data Source, N, Age	Outcome Measures	Effects
[139]	USA NLSY 1979-92, cohort study, 6,944, age 27-35	Heavy drinking Frequency of heavy drinking during past 30 days	Duration of unemployment increased the risk of being a heavy drinker and increased the frequency of heavy drinking
[140]	USA PSID 1998-2000, panel study, 3,451, age Ø 43.0	Number of drinks per day Number of cigarettes per day	Unemployed without receiving benefits had a greater likelihood to increase their alcohol consumption and (but without statistical significance) their smoking
[112]	USA HRS 1992-2002, plant closure study, 6,726, age 51-61	Number of alcoholic drinks per day	Increasing drinking patterns after involuntary job loss among individuals already being problem drinkers before job loss
[141]	USA Woodlawn study 1966-77, cohort study, 725, age 15-43	Onset of alcohol abuse/depend- ence (DSM-III/IV) Onset of drug abuse/dependence (DSM-III/IV) Onset of cocaine/ heroin use	Unemployment in early adulthood was a risk factor for subsequent onset of cocaine/heroin use and for drug use disorders, but not for alcohol disorders
[146]	Sweden plant closure study 1987-88, 14,926 displaced, 164,193 non- displaced workers, age 20-64	Hospitalization due to alcohol- related disorders (DSM-8/9/10)	Involuntary job loss increases the risk of hospitalization due to alcohol- related disorders among both men and women

CHDS: Christchurch Health and Development Study, ECA: Epidemiological Catchment Area Project, HRS: Health and Retirement Study, MFS: Monitoring the Future Study, WHDS: Winnipeg Health and Drinking Survey, NCDS: National Child Development Study, NHIS: National Health Interview Survey, NLSY: National Longitudinal Survey of Youth, NSYP: National Survey of Young Peoples Adjustment to School and Work, PSID: Panel Study of Income Dynamics, CAGE: Questionnaire [207].

loss and subsequent unemployment [138]. There are, however, some studies that found statistical, but few substantial differences [81, 110].

The studies differ from one another along a number of aspects, especially in terms of the selected samples and outcome measures. However, a review of these articles revealed the following general trends in terms of unemployment and specific type of substance use:

- Nine studies found that unemployment increased alcohol use and the incidence of alcohol disorders [86, 111, 112, 127, 128, 130, 139, 140, 146]. Three reported no such effects [126, 137, 141] while the results of the remaining two studies were mixed [81, 135].
- The findings were more consistent in terms of illicit drug use [126, 130, 136, 137, 141], smoking [129, 130, 134, 137, 138, 140] and prescription drug use [110, 137]; all studies here reported an increased risk of substance use during unemployment.
- Only two out the six studies that examined sex differences [110, 111, 126, 128, 129, 146] reported a statistically significant effect of unemployment for women, specifically in terms of smoking behaviors [129] and hospitalization due to alcohol-related disorders [146].
- Seven studies found consistently a significant effect of unemployment on substance use in adolescent samples [129, 128-130, 133, 134, 136]. Please note that the same or similar samples were used in three of the seven studies [129-130, 136].
- The duration of unemployment reported by the participants in the studies ranged from <6 to 24 months. Six investigations compared short-term and long-term unemployed groups and found that long-

term unemployment was associated with a significantly higher risk of problematic substance use [128-130, 136, 138, 139].

At present, only one study has researched whether or not substance abuse (which may have developed during unemployment) will eventually diminish or cease entirely upon re-employment. Dooley and Prause [131, 133] reported a significant decrease in the risk of binge drinking among the re-employed relative to respondents who remained unemployed.

5.2. Discussion

These findings demonstrate that job loss/unemployment is a risk factor for substance use and substance use disorders. Therefore the higher prevalence rates for substance use amongst the unemployed compared to the employed (Table 1, Section 3) are not just a reflection of selection, but are also a result of unemployment. However, in terms of smoking quotas, the causal effects are likely to be very limited. Most unemployed adults start smoking at a significantly earlier age, often in adolescence. The main effect of unemployment on smoking behaviors amongst adults pertains to their increasing consumption and frequency with which they will smoke tobacco. In contrast, the effect of unemployment for adolescents seems to be that unemployment increases the likelihood that they will start smoking [129].

A number of limitations should be mentioned at this point. First, some researchers failed to provide a sufficiently theoretical or empirical rationale when identifying potential confounds and controlling for these in their analyses. As a result, it is possible that unknown and unidentified confounds influenced the results (such as adolescent's attitude toward focusing on schoolwork, parental substance use, and deviant peer affiliations). Only a few studies have considered these issues in their statistical analyses [130, 136, 138].

Second, we also have to assume that the reported findings represent underestimates for three specific reasons:

- (a) Not all investigators collected data about why and how their participants became unemployed (voluntary vs involuntary). The unemployed samples probably also include those individuals who chose to leave their last job voluntarily, and hence are less likely to report negative effects of unemployment. This assumption is also supported by Ettner [81]. She found that the negative effects were only observed amongst those who were dismissed (involuntary unemployment). On the other hand, she reported a significant decline of alcohol consumption when analyzing the trends of the entire sample of the non-employed (voluntary and involuntary unemployed).
- (b) The plant closure studies [110-112, 146] did not assess how many of the workers remained unemployed. Some of the workers may have found new employment even before the plant officially closed, or shortly thereafter. This means that the observed unemployment effects are underestimated [see also 112, 135].
- (c) A comprehensive review of the international literature shows that even the fear of job loss can increase the consumption of alcohol, tobacco, and prescription drugs [142]. As a result, we may observe a ceiling effect. Therefore, while the consumption of these substances may increase initially in anticipation of impending unemployment, it may not actually increase (significantly) beyond this first level when the same individuals subsequently become unemployed as anticipated.

The studies listed in Table 3 show that job loss/unemployment is a relevant risk factor of substance use and substance disorders. But we know that the increasing effects on substance use/disorders only seem to apply to a minority of the unemployed overall. This suggests that there are groups that are more at risk than others. At present, only three rather general conclusions may be drawn about potential risk groups from the findings in Table 3. The long-term unemployed are more likely to be at risk of substance use and disorders than the short-term unemployed. In addition, men seem to be at greater risk than women. Unemployment may be less stressful for women than men for two reasons. Their various social roles (as house wife, mother) may help them to maintain their level of self-esteem and give them more access to social support. Finally, the study of Deb *et al.* [112] provides evidence that individuals already using substances problematically prior to job loss are more likely to respond to job loss by increasing their substance use, so that these further increases may be especially problematic.

The authors of the studies listed in Table 3 all assume that the psychosocial problems experienced during unemployment are responsible for increasing the prevalence of substance use and substance disorders. This is a plausible assumption. If the unemployed increase their consumption of various substances (e.g., alcohol and tobacco), despite having a considerably lower income, then it is reasonable to assume that this behavioral change is probably a reaction to

the psychosocial problems and demands brought on by unemployment. Further research is required to identify which of the many potential mental and social effects of unemployment (e.g., boredom, anxiety about the future, depressive episodes, and social isolation) play a significant causal role.

In addition, future research should examine the role of income loss. To date, only one study tried to answer this question [127]. The authors found that the loss of income did not influence the likelihood of becoming alcohol dependent (according to DSM-III). However, in view of the significant income loss reported by the unemployed, it is reasonable to assume that at least a portion of the unemployed will cut down their alcohol and tobacco consumption. This may only become apparent when the research starts assessing the patterns of substance use more systematically and differentiates problematic patterns from those that are customary of national culture and life styles (e.g., enjoying alcohol as regular part of a meal). On the other hand, it is important to note that the income loss can be overcome to some extent by selecting less expensive alcohol and tobacco wares.

At present, there is no research available that considers both the level of alcohol, drug, and tobacco use due to work-related stress prior to unemployment and whether or not substance use will decline once an individual has become unemployed and these stressors are no longer present.

5.3. Implications for Research and Practice

The current state of research provides evidence that there are substantial causal effects of job loss/unemployment on substance use and substance disorders. This finding is of high practical importance for two reasons: First, it suggests that lowering the rate of unemployment is likely to be one element of effective policies aimed at reducing rates of substance use and substance use disorders. Second, current research provides evidence that verifies the need for more alcohol, tobacco, and drug prevention initiatives to be offered to the unemployed.

From this point forward, it is therefore up to the policy makers to minimize unemployment and to create the structures and preventive measures so as to reduce the prevalence of substance abuse and substance use disorders amongst the unemployed.

Reaching as many of the unemployed as early as possible is another important objective to be kept in mind. Job centers provide an optional point of contact once more (as already outlined in section 3.3) to implement screening, conduct brief interventions, and to organize motivational interviewing (MI) in cooperation with local addiction counseling and treatment facilities to help motivate the unemployed to seek counseling.

Future research efforts should focus on identifying specific risk groups and risk factors so as to help target and develop preventive measures accordingly. In addition, it is essential to widen the scope of the research by investigating the indirect consequences of unemployment for the families. Two studies underline this further [143, 144]. A family member's job loss was identified as a significant risk factor

associated with smoking among adolescents. Similar risk constellations may exist in relation to alcohol consumption and illicit drug use.

In order to assess the effect of unemployment further, it is important to isolate potential effects that are due to reverse causality. However, in real world, it is important to consider the interaction of these effects. Unfavorable circumstances may lead to the unemployed being caught in a vicious cycle that is defined by a continued deterioration of their situation: Employees with problematic substance use are more likely to lose their job. Their substance use becomes more severe during unemployment (also see [112]). This, in turn, impacts their job search and reduces their chances on the labor market further. Being unemployed may therefore result in lasting as well as increasingly severe substance use. These circumstances may culminate in an almost irreversible process of continued occupational exclusion. Future research in this area should therefore make it a priority to examining these complex interactions in more detail.

Problematic substance use is a cause and a result of unemployment [86]. This bidirectional relationship also needs to be addressed in future research when estimating the economic costs of substance abuse due to lost productivity. These estimates [79, 80] are based on the erroneous assumption that substance abuse is not itself affected by one's employment status, an assumption that should be revised.

It is also important to investigate if the effect of unemployment on substance abuse is different in magnitude (more or less) compared to the effect of substance use on unemployment. This has not been addressed in any studies.

6. DOES UNEMPLOYMENT INCREASE THE RISK OF RELAPSE AFTER ALCOHOL AND DRUG ADDICTION TREATMENT?

Against the background of the findings outlined in Section 4 and 5 it will not come as a surprise to readers that the unemployment rate of patients treated for alcohol and drug addiction is disproportionately high compared to the national unemployment rate, a finding that is identical across many countries. The latest data from the European Monitoring Centre for Drugs and Drug Addiction [62] indicate that the unemployment rates among outpatients being treated for alcohol or drug addiction range from 26% to 69%, with most EU countries reporting an average rate of 48% among these clients. For inpatients receiving similar treatments, the rates range from 25% to 80%, with an average rate of 52%. These high rates are the result of the significant increase of the unemployment level since the 1980s [145, 155]. This connection was demonstrated by Eliason and Storrie ([146], see Section 5.1, Table 3) using longitudinal individual level data. The individuals surveyed lost their jobs following a wave of industrial closures in 1987/1988 in Sweden. The study demonstrated that job loss significantly increased the risk of hospitalization due to alcohol-related disorders (according to ICD-8/9/10).

As a result, it is of great interest to examine how unemployment influences the effectiveness of addiction therapy. The literature search helped to identify two relevant studies, one of which was a meta-analysis [147] while the

other was a systematic review [148] of the various predictors of alcohol and drug treatment outcomes. The two studies each summarized the findings of 69 and 51 studies, respectively. These studies were selected based on the following criteria: (a) The participants were opiate/alcohol addicts. (b) All subjects had undergone some form of professional treatment for their opiate/alcohol dependence. (c) The studies all included outcome measures of continued opiate/alcohol use or relapse during or after the completion of treatment. (d) The studies used longitudinal models. (e) The independent variable (e.g., unemployment) as a possible outcome predictor referred to a time period prior to or concurrent with the time period to which the dependent variable (e.g., relapse) referred.

6.1. Results

The meta-analysis [147] resulted in the identification of ten patient-related factors, each of which had statistically significant and longitudinally predictive relationships with continued drug use during and after treatment. The ten factors include: a high level of pre-treatment opiate or drug use, prior treatment for opiate addiction, no prior abstinence from opiates, abstinence from or light use of alcohol, depression, high stress, associations with substance abusing peers, short length of treatment, leaving treatment prior to completion and unemployment/employment problems. That is, unemployed individuals are more likely to continue using drugs during treatment and to relapse following treatment compared to those who are employed.

According to the results of the systematic review [148], better treatment outcomes are more likely if the individuals were female, had higher socioeconomic status, attended religious events more frequently, had a lower baseline alcohol consumption, lower alcohol dependence severity, fewer prior treatments for alcohol addiction, higher alcohol-related self-efficacy, higher motivation, treatment goal alcohol abstinence, lower psychopathological rating, better neuropsychological functioning, and were in paid employment.

In addition to the meta-analysis and review described above, three more studies were located (using the same aforementioned inclusion criteria). In each case, the authors' multivariate prediction analyses clearly demonstrated that achieving paid employment constitutes one of the most important factors in sustaining recovery from alcohol and drug addiction [149-151]. One of the three studies assessed the treatment success of 929 alcohol addicts [152, 153]. This sample was chosen to be representative of the inpatient population undergoing addiction therapy in Germany. The researchers were able to show, after controlling for numerous confounders and reverse causality, that those patients who remained unemployed after treatment were 2-3 times more likely to relapse than the employed. Furthermore, the study offers strong evidence that the unemployed relapsed more severely, and also significantly earlier than those patients who still had paid employment and those who successfully found employment after treatment. Put in concrete terms: 45% of the unemployed vs 23% of the employed relapsed during the first six months after treatment, 72% vs 40% of them relapsed severely (that is, they were classified as alcohol dependent once again based on ICD-10 criteria), and

33% vs 19% relapsed already during the first month after treatment. The results of multiple regression analysis revealed that relapsing was significantly predicted by three factors. The first predictor was a patient's past treatment record (that is, whether or not they had received treatment for alcohol addiction before). The second predictor was whether or not patients completed the treatment. And the third predictor of relapse, and most relevant to this discussion, was unemployment.

6.2. Discussion and Implications for Research and Practice

There is strong evidence that unemployment substantially increases the risk of relapse. Being employed prevents relapses. This suggests that it is of great practical importance to prevent relapses by helping the unemployed with their (re)integration into the labor force. This would also serve to avoid the high costs associated with further treatment. However, several studies also show that abstaining from alcohol or drug use alone is unlikely to guarantee successful and enduring (re-)employment in most cases [149, 150, 154, 155].

A large percentage of people with substance use disorders experience severe difficulties trying to find and hold down a job (see Section 4). For example, on average, about 40% of the drug addicts starting treatment (as inpatient or outpatients) in the European Union have not completed their secondary education [62]. Alcohol and drug addicts, as a rule, tend to require more intensive employment-related assistance and promotion, e.g., assessment of individual vocational needs, training in job-searching skills and access to employment support programs.

Improving employability and achieving paid employment through educational programs and vocational training have clearly shown to enhance health and social functioning as well as the success of substance-related addiction treatments [149-151, 154, 156, 157]. A patient's employment status is therefore increasingly considered as an important predictor of treatment outcome [107, 155-158].

Unfortunately, in most cases successfully completing educational and vocational rehabilitation programs alone has not been found to predict subsequent employment, even when individuals show significant improvements due to addiction therapy for their drug and alcohol dependence. Numerous other barriers still exist in addition to the limited educational and vocational qualifications which may complicate or even prevent individuals from returning to employment: frequent and severe relapses over time following therapy, earlier convictions (especially amongst drug addicts), chronic health problems, advanced age (amongst alcohol addicts), numerous previous periods of unemployment, and lack of motivation as many individuals are frequently demoralized due to long-lasting unemployment [68, 149, 150, 153-156, 159].

Various systemic or structural reasons for unsuccessful occupational reintegration have also been outlined in a variety of studies: (a) There is no organized cooperative framework in place to help patients to access assistance from job centers and providers of other vocational services, (b) the employees at these centers are not sufficiently trained to

work in collaboration with treatment centers, and (c) at present, the educational and vocational employment-related programs are not sufficiently tailored to the different needs and abilities of drug and alcohol addicts [68, 150, 156, 157, 160-162].

More research is needed to identify best practices, e.g., the most useful programs and measures, to meet the different needs and abilities of the various client groups. For methodological issues in designing and implementing of those studies, see [163]. Policy makers should foster such research to protect drug and alcohol addicts from further exclusion and improve their social inclusion.

7. DOES UNEMPLOYMENT REDUCE THE PROBABILITY OF SMOKING CESSATION?

Although strong evidence demonstrating the high prevalence of smoking among the unemployed (Table 1, Section 3) has existed for numerous years, there is very little information available about the effect of becoming or being unemployed on smoking cessation. Literature searches revealed numerous systematic reviews and meta-analyses that analyzed pharmacotherapeutic, behavioral and psychosocial interventions for smoking cessation [164-167], but none of these studies considered job loss or unemployment as a potential predictor.

Another review encompassed 51 studies, all of which focused on smoking cessation amongst young adults [168]. However, only three of these 51 studies included unemployed and employed subjects in their samples [169-171]. The following discussion of results considers these three, in addition to another seven studies identified in the literature search. All 10 studies fulfilled the following selection criteria: (a) Studies used a longitudinal model. (b) They each used a representative population-based sample or a sample of participants of smoking cessation programs recruited at random from the general population. (c) They provided explicit definition of the employment status (paid employed, unemployed without persons out of labor force). (d) They conducted multivariate analysis controlling for relevant confounders (age, gender, educational level, income, socioeconomic status, marital status, ethnicity etc.).

The studies originated from the USA [138, 169, 170, 172, 173], Denmark [174, 175], Finland [171], Great Britain [176] and the European Union [177].

7.1. Results

The results show a mixed picture. Six studies revealed that unemployment significantly reduces the probability of smoking cessation [169, 171-173, 175] and that job loss increases the risk of a relapse after a period of smoking cessation [138]. No significant effects were reported in the remaining four studies [170, 174, 176, 177].

Most of them are based on the natural history of smoking and three are intervention studies [171, 173, 177]. They used different outcome measures, e.g. cessation rate seven days after intervention or rate of sustained abstinence during one year after intervention. The samples consisted of either adults, adolescents [171, 172] or men only [175]. Unfortunately, no systematic general trends were observed

across the various studies to clarify the inconsistent findings to date.

7.2. Discussion and Implications for Research and Practice

The need for more research is obvious. Such future work should focus on the evaluation of various intervention methods for the unemployed. It is important to know which of these smoking cessation measures are most effective over the long-run while also reaching as many of the unemployed as possible. Pilot projects of this nature in Germany have shown that it is possible to achieve these goals when these measures for smoking cessation are fully linked to programs aimed at enhancing the employability and vocational integration of the unemployed [178]. Policy makers and health insurances organizations are encouraged to support such research because the high prevalence of smoking amongst the unemployment is without any doubt one of the most significant causes of health problems in this group.

8. BUSINESS CYCLE, UNEMPLOYMENT RATE AND SUBSTANCE USE

Given that unemployment is a risk factor for substance use and substance use disorders (see Section 5), we would expect to see an increase in the consumption of alcohol, tobacco and drugs (holding all other factors constant) when the economy deteriorates and the unemployment rate increases in turn. This does suggest a countercyclical pattern. However, to what extent is this substantiated in the current research?

In order to answer this question, a number of studies were selected using the following criteria: (a) The studies used the unemployment rate or employment-population-ratio as an indicator of macroeconomic change (boom, recession). (b) The investigations focused on a precise period of time. (c) The data analysis was carried out using econometric methods (for details, see [179]). (d) The researchers used representative aggregated or individual level data on consumption patterns (alcohol, tobacco, and drugs) and the occurrence of related health issues and specific behaviors (e.g., alcohol mortality, liver cirrhosis mortality, and drunk driving). In total, 14 studies were identified that fulfilled these criteria (Table 4). Of these, nine originated from the USA, three were conducted in Finland, and one each came from Canada and Sweden.

8.1. Results

At first, let us review some of the past literature on this topic. Widely cited analyses of aggregate time-series data by Brenner (USA) actually revealed a countercyclical variation between changes in the national unemployment rate, per capita alcohol consumption and the mortality rate associated with liver cirrhosis [2-4]. However, this research suffers from a number of serious technical flaws (for details, see [180-184]). Furthermore, a number of studies that tried to address and correct for these problems failed to uncover a

consistent relationship between the macroeconomic indicators and the above mentioned alcohol-related variables [185-187].

The more recent econometric analyses that appeared since the 1990s utilized more sophisticated methodological approaches. These analyses produced results that predominantly diverged from earlier findings (Table 4). Ruhm [188] was the first to report a significant procyclical variation between the unemployment rate, per capita alcohol consumption, and alcohol-related highway vehicle fatalities using official U.S.-based reports from 1975 to 1988 (aggregate data). Improvements in economic conditions measured by unemployment rate were associated with an increase in consumption and vehicle fatalities. Freeman [189] used a more robust analytical model and confirmed Ruhm's findings.

However, the use of aggregate data in both studies is problematic for two reasons: (a) the data were based on alcohol sales and not actual alcohol consumption; not all sales of alcoholic beverages in a given year may have been consumed in that year; (b) the data does not account for homemade alcoholic beverages (beer, wine, spirits) and illegal sales; and, above all; (c) the aggregate data are based on the population at large, which means it is impossible to establish individual consumption behavior. For example, aggregate consumption might decline during a recession because workers drink less. At the same time, however, persons becoming involuntary unemployed may raise their intake of alcohol.

Ruhm [191] and Dee [192] took these potential shortcomings into account, using individual data instead. However, the results were inconsistent (Table 4), potentially a result of an inadequate study design (for details, see [179]). Only a limited set of explanatory variables were included. Neither Ruhm [191] nor Dee [192] controlled for changes in alcohol taxes or prices during the study period.

As a result, further research was conducted using the same survey data [179]. This study was well-designed and revealed that, after controlling for many confounding variables (prices/taxes, age, gender, educational level, race, ethnicity, marital status, etc.), drinking participation (the number of drinkers) is practically insensitive to changes in the unemployment rate. However, drunk-driving becomes clearly less common during a recession and light, moderate, and especially heavy/very heavy drinking ($\geq 60/100$ units per month, see Table 4) exhibited a clear procyclical variation. For example, a one percentage point increase in state unemployment was predicted to reduce heavy drinking, very heavy drinking and alcohol-involved driving by 7.8, 9.7, and 3.3 percent, respectively [179].

At present there is no study that has directly examined the interrelation between business cycle, alcohol abuse and dependence (DSM-IV, ICD-10). We do know that heavy alcohol use is associated with alcohol problems. The results of Ruhm and Black [179] therefore provide evidence that at least alcohol abuse is procyclical. Drunk-driving also represents a typical case of alcohol abuse. Consistent with the results reported above, drunk-driving has also been shown to vary procyclically.

Table 4. Business Cycle/Unemployment Rate and Substance Use

Refs.	Economic Variables, Time Period	Dependent Variables	Data Level, N, Age	Results
Alcohol Consumption, Alcohol-Related Mortality				
[188]	USA UR, EPR, PI, 1975-88	Per capita consumption of beer, wine and spirits and total alcohol consumption Alcohol-related highway vehicle fatalities	Aggregate-level age >14	Procyclical variations in vehicle fatality rate and in all alcohol consumption categories. Spirits consumption was by far most sensitive to economic change.
[189]	USA EPR, PI 1970-95	Per capita consumption of beer, wine, spirits and total alcohol consumption	Aggregate-level age >14	Procyclical variations in all alcohol consumption categories
[190]	Finland UR, 1987-95	Alcohol-related mortality (ICD-9/10) Per capita alcohol consumption	Register-based Aggregate-level age 15-74	Procyclical. Mortality and alcohol consumption increased during economic boom/decreasing UR and decreased slightly during depression from 1991 onwards. Among men variation was largest in the young age group. No systematic pattern among females. People with low socioeconomic status tended to have a stronger increase during boom and a smaller decrease during recession
[191]	USA UR, PI 1987-95	Drinking participation (number of alcohol user) Number of drinks during last month	Individual-level BRFSS-Survey, >50.000 each year, age ≥16	Countercyclical variations in the number of drinkers and number of drinks
[192]	USA UR, PI 1984-95	Drinking participation Number of drinks per month Having ≥60 drinks during last month Binge drinking (≥5 drinks on one occasion at least once during last month)	Individual-level BRFSS-Survey, >50.000 each year, age ≥18	Procyclical variations in all alcohol consumption categories, except drinking participation Countercyclical variations in binge drinking
[179]	USA UR, PI 1987-99	Drinking participation Number of drinks per month (light, moderate, heavy drinking, heavy/very heavy ≥60/100 drinks per month) Binge drinking (≥5 drinks on a single occasion at least once during last month) Alcohol-involved driving	Individual-level BRFSS-Survey, >50.000 each year, age ≥16	Procyclical variations in all alcohol consumption categories and alcohol-involved driving. These variations largely resulted from changes in consumption among existing drinkers. Large variations among heavy/very heavy consumers. Job losers as well as those remaining employed reduced their consumption when UR increases. Small variations in binge drinking
[193]	USA UR, GDP 1900-96	Livercirrhosis mortality	Register-based Total population	Procyclical. The decline of mortality caused by livercirrhosis accelerated during recession/increasing unemployment rate and was reduced or even reversed during economic expansion
[194]	Finland EPR 1975-02	Alcohol-related mortality (ICD-9/10) Drinking participation Number of drinks past week	Register-based Individual-level HPS, ≈5.000 each year, age 16-65	Procyclical variations in alcohol consumption. No effect on drinking participation. Countercyclical variation in alcohol mortality, except during the great depression in the early 1990s when mortality decreased
[195]	Finland UR, 1985-03	Alcohol-related mortality (ICD-9/10)	Register-based age ≥15	Procyclical. Among males and females alcohol mortality increased along with decreasing UR, but only among groups aged over 45 years, and increased stronger in lower educational groups
[196]	Canada UR, PI 1981-04	Per capita consumption of beer, wine and spirits and total alcohol consumption	Aggregate-level age ≥15	Procyclical variations in beer consumption. No effect on wine and spirit consumption
[197]	Sweden UR, 1988-05	Frequency of alcohol drinking during current school year Binge drinking at least once during current school year	Individual level School Survey, >2.300 each year, age 15-16	Procyclical variations in the number of drinkers and in binge drinking. The effects were stronger among girls. Regular drinking (≥2/month) was unrelated to UR

(Table 4) contd.....

Refs.	Economic Variables, Time Period	Dependent Variables	Data Level, N, Age	Results
Smoking				
[191]	USA UR, PI 1987-95	Number of current smokers Number of cigarettes smoked per day (smokers only)	Individual-level BRFSS-Survey, >50.000 each year, age ≥16	Procyclical variations in the number of smokers and number of smoked cigarettes
[199]	USA UR, PI 1987-00	Number of current smokers Smoking at least 20 cigarettes daily (smokers only) Heavy/very heavy smoking ≥20/40 cigarettes daily (smokers only)	Individual-level BRFSS-Survey, >50.000 each year, age ≥16	Procyclical variations in all smoking categories. The drop in tobacco use, when UR increased, occurred disproportionately among heavy/very heavy smokers
Illicit Drug Use				
[200]	USA UR, 1996-04	Use of marijuana Use of cocaine/hard drugs Use of alcohol past 30 days Heavy use of marijuana (used in ≥20 days during past 30 days) Heavy use of cocaine/hard drugs (used in ≥5 days since last interview) Binge drinking past 30 days Drug selling	Individual-level NLSY 1996-2004, 8.984, age 16-18	Countercyclical variations in use and heavy use of marijuana and cocaine/hard drugs and in drug selling among males and females, Whites and Blacks. For alcohol use countercyclical changes were significant only for the number of days used in past 30 days

UR unemployment rate, EPR employment-population-ratio, PI personal income per capita. GDP real gross domestic product, BRFSS Behavioral Risk Factor Surveillance System, NLSY National Longitudinal Survey of Youth, HPS Health Population Survey

Unambiguous procyclical variations between the unemployment rate and the mortality rate due to liver cirrhosis were also reported [193]. This study is particularly noteworthy as it considered data going back almost hundred years (USA 1900-1996). On the other hand, it should be noted that whereas liver cirrhosis is very frequently associated with alcohol consumption, this may not always be the case.

A variety of other countries (Canada, Finland, Sweden) have also examined the patterns of alcohol consumption and alcohol-related mortality [195-197]. Their results are generally consistent with findings based on U.S. research. One study represents a partial exception to this trend [194]. These authors examined alcohol-related mortality in Finland and reported countercyclical variations, except for the early 1990s during which Finland experienced a significant economic depression and mortality (procyclically) decreased.

Smoking patterns were researched as well. Two studies from the USA reported a procyclical trend for smoking [191, 199, also see 198]. That seems to apply in particular for heavy/very heavy smokers consuming 20/40 or more cigarettes per day [199] (Table 4). However, the effect sizes for smoking are smaller than for drinking. A one percentage point increase in state unemployment was predicted to reduce current, heavy and very heavy smoking by 0.6, 1.0 and 1.1 percent [199, 201]. Heavy smoking, especially very heavy smoking, is usually indicative of nicotine dependence. We may therefore assume that nicotine dependence is also procyclical. Future research is needed to establish whether or not these findings also generalize to other countries.

Despite an extensive literature research, only one study could be located that investigated the relationship between

economic changes and illicit drug use [200] (Table 4). This study used individual level and longitudinal data. The study findings provided strong evidence that links a weaker economy to increased consumption of marijuana, alcohol, cocaine and other hard drugs amongst adolescents. For marijuana, a one percentage point increase in the unemployment rate was estimated to increase the prevalence of marijuana use by 4.1 percent, and the prevalence of cocaine and other hard drugs by 1.2 percent. In addition, the author found evidence that adolescents are more likely to sell illicit drugs when the economy deteriorates and unemployment increases. One plausible explanation is that when there are no legal paid jobs available to adolescents, they are more likely to start selling drugs instead. The author suggests that this may be a major explanation for the observed countercyclical pattern of drug use, because an increase in drug selling would make it easier to obtain illicit drugs. However, this does not explain the opposing patterns, specifically, why drinking and smoking are procyclical and patterns of drug use amongst adolescents appears to be countercyclical.

8.2. Discussion

The current state of research provides evidence that alcohol consumption and smoking vary procyclically. There may be three different explanations. First, incomes decline when unemployment increases and alcohol and cigarettes become costly. It is therefore not surprising that the decreases in consumption are concentrated among heavy drinkers and smokers [179, 199]. However, income differences do not explain everything. Some studies used both unemployment rate as well as per capita income as indicators for economic change. In those cases, researchers

noted that the unemployment rate seems to have a procyclical effect, regardless of income [179, 189, 191, 196, 199]. Second, when employment rates dip, fewer individuals may be subject to work-related stress, subsequently reducing stress-induced drinking and smoking. Third, as the level of unemployment increases, so does the fear of losing one's job amongst the remaining workforce. This may reduce the likelihood that these individuals consume alcohol or tobacco so as to remain inconspicuous and potentially minimize the risk of being dismissed for inappropriate conduct. Two studies were able to show that when unemployment increased, employees tended to reduce their alcohol consumption [202, 203]. This effect has been attributed to attempts by those who fear job loss to become more like the ideal employee. On the other hand, there is also empirical evidence that suggest that job insecurity and fear of dismissal (as previously outlined in Section 5) may increase the consumption of alcohol and tobacco amongst some of the employees [142]. More research is required to understand these associations.

The procyclical findings seem to contradict the conclusion drawn in section 5 that unemployment represents a risk factor for substance use. However, it is important to realize that 6 studies listed in Table 4 used aggregated data [188-190, 193, 195, 196]. Such data do not allow us to deduce individual consumption patterns. As a result, these studies tell us very little about the effect of job loss on the consumption of tobacco and alcohol, and alcohol-related mortality of the unemployed.

At present, there is only one study available that looks specifically at the unemployed [179] (Table 4). Ruhm and Black found that the alcohol consumption varied in a procyclical fashion amongst the unemployed, similar to the trend observed for the population at large in the studies mentioned above. For example, a one percentage point increase in state unemployment rate was predicted to produce an almost 6 percent decrease in heavy drinking among the unemployed. It may be possible, however, that this result is the product of an artifact: The decrease in heavy drinking under conditions of increasing unemployment rates may be the result of increasingly non-selective layoffs (e.g., due to companies and company units being closed). This may decrease the proportion of heavy drinkers amongst the unemployed. However, when unemployment rate decline, the proportion of heavy drinkers will increase as dismissals become more individually selective, resulting in a higher dismissal rate for these substance users in contrast to the general working population. Procyclical decreases in heavy drinking, may consequently reflect a decline in the number of individuals with substance use issues being made redundant during dire economic times, rather than a causal impact of job loss. Only longitudinal research may clarify these circumstances. The study by Ruhm and Black [179] is based on repeated cross-sections. The investigation by Arkes [200] utilized longitudinal data. However, the study does not provide any information about the drug consumption of the unemployed.

The procyclical relationship between unemployment and alcohol/tobacco use and the countercyclical relationship

between unemployment and illicit drug use suggest that legal prohibition moderates these differing patterns. More research is required to understand these associations.

An additional criticism to be levied against the studies in Table 4 concerns the fact that the unemployment rate used in each of these study was based on only those individuals that officially registered as unemployed. The number of individuals who are out of work, but have not officially registered as such, may be quite significant and fluctuate across years. This has repercussions for the reliability and generalizability of research findings. This problem should be considered in future research.

Econometric analyses provide two important advantages. First, there is no reverse causality issue between the unemployment rate, on the one hand, and the substance use, on the other. The direction of the effect is determined *a priori*. The national unemployment rate is not determined by national alcohol, tobacco, and drug consumption, at least not under conditions of a high unemployment level. Second, econometric analyses allow for the evaluation of the net effect of economic recession, that is, the balance calculated between the patterns of increases and decreases in the national consumption of alcohol, tobacco, and drugs. Research findings suggest that the net effect is linked to lower consumption of alcohol and tobacco and lower alcohol-related mortality rates, at least according to trends observed in the USA, Finland, Sweden and Canada.

Summing up, it is important to note that current econometric findings do not challenge or repudiate the conclusion drawn in the epidemiological review in Section 5, that unemployment is a risk factor for substance use and substance disorders. It is therefore still true that there is a disproportionately high need for more prevention activities that address alcohol, tobacco and drug use amongst the unemployed.

8.3. Implications for Policy Makers

Two critical comments are warranted here, reiterating some concerns already voiced by Catalano and Bellows [204]:

First, given that drinking and smoking are procyclical, does this mean that policy makers should be advised to allow or encourage economic contraction and increasing unemployment rates as a means to decrease alcohol and tobacco consumption and related morbidity and mortality? Such politics would undoubtedly work against the interests and needs of the majority of the population. It would also have severe consequences for the social and health insurance system. More importantly, however, such politics would, for all intents and purposes, mostly impinge on those individuals who lose their job. And, by extension, also their families would be affected. This is clearly problematic in line of the findings discussed in sections 5 and 6, and what we know today about the negative impact that unemployment has on physical and mental health. The large body of epidemiological literature on this topic and this population suggests that losing one's job is strongly associated with a

higher incidence of mental disorders, greater morbidity and mortality [109, 204, 205].

Second, the procyclical findings, and especially the net-effect conclusion based on this research, could potentially provide a pretext to policy makers to justify cutting back on funding for addiction counseling and treatment services in bad economic times. However, the research has established that the demand for counseling and treatment tends to increase, instead of decrease when the economy declines. This increase can be traced back, to a large degree, to the unemployed. At least, this seems to be the case in Germany [152, 155], and is most likely to be the same in other countries as well. This means that such political maneuvering will primarily affect the unemployed.

9. FINAL REMARKS

This review demonstrate that multiple and relevant links exist between unemployment and substance use and substance use disorders. Significant progress has been made over the last twenty years of research (1990-2010) reviewed in this chapter in reference to the empirical clarification of these associations. At the same time, as outlined in the different sections, numerous questions still remain to be answered, especially in relation to the concrete moderators and mediators that operate in this context. More research is undoubtedly necessary at this stage. This will require extensive funding. Examining the links between unemployment, substance use and substance disorders has significant implications not just for the economy, but also for public health, for alcohol, drug and smoking prevention, addiction counseling, and the treatment and vocational services system.

10. LIMITATIONS

This review has two limitations. First, some studies may not have been identified, and thus not included. This may be especially the case for all those studies that were published in other languages than English or German. Second, the implications for practice were kept simple and may therefore not take into account unique features and exceptions that exist in different countries. Countries differ on a variety of dimensions such as their unemployment politics and insurance schemes, the aims and targets of their job centers, the various national programs for vocational reintegration and rehabilitation, and their organization of addiction counseling and treatment services.

Key Learning Objectives:

1. To become familiar with the different relationships between unemployment and substance use and substance use disorders.
2. To learn more about current research evidence, and which questions have been answered to date, while also identifying those questions which still remain.
3. To expand our current knowledge about the practical conclusions and consequences that can be drawn based on the current research.

Future Research Questions:

1. Can we identify those groups amongst the unemployed that also have higher prevalence rates indicative of problematic substance use, especially as these also have a more urgent need for prevention and treatment?
2. Which specific groups amongst the unemployed are more likely to be at risk for problematic substance use?
3. Which psychosocial mechanisms increase the risk of problem substance use under conditions of unemployment?
4. What types of practical interventions may effectively improve the vocational integration of specific groups of unemployed with substance use disorders?

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