



Review

How economic recessions and unemployment affect illegal drug use: A systematic realist literature review



Gera E. Nagelhout^{a,b,*}, Karin Hummel^a, Moniek C.M. de Goeij^c, Hein de Vries^a, Eileen Kaner^d, Paul Lemmens^a

^a Department of Health Promotion, Maastricht University (CAPHRI), PO Box 616, 6200 MD, Maastricht, The Netherlands

^b Department of Family Medicine, Maastricht University (CAPHRI), PO Box 616, 6200 MD, Maastricht, The Netherlands

^c Department of Public Health, Amsterdam Medical Center, University of Amsterdam, PO Box 22660, 1100 DD Amsterdam, The Netherlands

^d Institute of Health and Society, Newcastle University, NE2 4AX Newcastle upon Tyne, United Kingdom

ARTICLE INFO

Article history:

Received 4 October 2016

Received in revised form 15 March 2017

Accepted 22 March 2017

Keywords:

Economic recession

Unemployment

Illegal drug use

Systematic review

Realist review

ABSTRACT

Background: Economic recessions may influence illegal drug use via different mechanisms, for example increased use due to more psychological distress or decreased use due to lower incomes and purchasing power. This paper reviews the literature on how economic recessions and unemployment affect the use of illegal drugs among adults.

Methods: We conducted a systematic realist literature review, which is an explanatory method that aims to understand underlying mechanisms that connect an event to an outcome in a specific context. A systematic search was performed in EconLit, Embase, Medline, PsycINFO, SocIndex, and Web of Science for studies examining mechanisms explaining how recessions or unemployment affect illegal drug use. **Results:** We synthesized 28 studies published between 1990 and 2015. Most evidence (17 studies) was found for the counter-cyclical mechanism that recessions and unemployment increase psychological distress, which increases drug use. Mainly supportive evidence for this mechanism was found in several high quality studies, in different contexts, and in a diverse number of countries and samples. In contrast, decreased income did not seem to decrease drug use (10 studies). Little evidence was available on the non-working time mechanism (4 studies) and the social exclusion mechanism (5 studies). Most of the studies that did examine these latter mechanisms confirmed the hypothesized counter-cyclical associations.

Conclusion: The current evidence is in line with the hypothesis that drug use increases in times of recession because unemployment increases psychological distress which increases drug use. During times of recession, psychological support for those who lost their job and are vulnerable to drug use (relapse) is likely to be important.

© 2017 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Introduction

National and international economic recessions not only have financial and employment consequences for individuals living in those countries but also potential health consequences. During economic recessions, deteriorations in mental health and increases in suicides are observed at a population level (Catalano et al., 2011; Stuckler, Reeves, Karanikolos, & McKee, 2015; Uutela, 2010; Van Hal, 2015; Zivin, Paczkowski, & Galea, 2011). Both these outcomes are associated with illegal drug use (Miller, Mahler, & Gold, 1991;

Sinha, 2008). Several studies have examined the relation between recessions and illegal drug use at the population level. Examples are studies that compare illegal drug use in the period before and after a recession (Colell, Sánchez-Niubò, Delclos, Benavides, & Domingo-Salvany, 2015; Lakhdar & Bastianic, 2011; Rossi et al., 2011), examine the association between unemployment rates and illegal drug use (Arkes, 2011; Chalmers & Ritter, 2011), and the association between income per capita or gross salary growth rates and illegal drug use (Chalmers & Ritter, 2011; Lakhdar & Bastianic, 2011). It is important to investigate not only whether economic recessions affect illegal drug use at the aggregate level, but also which individual-level mechanisms might produce these effects (Catalano et al., 2011; Stuckler et al., 2015). This question is of scientific interest, but also of practical interest, because an intervention or policy to prevent possible increases in illegal drug

* Corresponding author at: Department of Health Promotion, Maastricht University (CAPHRI), PO Box 616, 6200 MD, Maastricht, The Netherlands.

E-mail address: gera.nagelhout@maastrichtuniversity.nl (G.E. Nagelhout).

use during recessions cannot be properly designed when it is unknown which mechanisms this intervention or policy should target (Stuckler et al., 2015; Xu, 2013).

The individual-level mechanisms through which events produce effects can be synthesized with the realist review method (Pawson, Greenhalgh, Harvey, & Walshe, 2005; Pawson, 2006). Realist literature reviewing is an explanatory method that aims to examine how complex phenomena work, and in what contexts they occur. The method is especially useful for synthesizing methodologically diverse empirical studies. Realist reviews start with a clarification of the scope of the review and a first exploratory background literature search. Then, an initial theoretical framework is constructed that focuses on contexts, mechanisms, and outcomes, and sets out how and why phenomena have certain effects. In the next stage of a realist review, this theoretical framework is tested using empirical evidence from both quantitative and qualitative studies. Finally, the initial theoretical framework is revised.

An initial scoping search indicated that few studies have directly examined the relationship between economic recessions and illegal drug use. Thus, in our systematic realist literature review, we also included literature on the relationship between

unemployment and illegal drugs. This was done because nine out of ten recessions coincide with increases in unemployment rates (Claessens, Kose, & Terrones, 2008) and because the same individual-level mechanisms that affect illegal drug use can apply to recessions and unemployment (Dubanowicz & Lemmens, 2015; Henkel, 2011).

In the current systematic realist literature review on how economic recessions and unemployment affect illegal drug use, the initial theoretical framework was constructed based on six key publications on the relationship between recessions or unemployment and illegal drug use or substance use in general (Bretteville-Jensen, 2011; Catalano et al., 2011; Dubanowicz & Lemmens, 2015; Falagas, Vouloumanou, Mavros, & Karageorgopoulos, 2009; Henkel, 2011; Ritter & Chalmers, 2011). In these publications, five potential mechanisms through which recessions or unemployment could affect illegal drug use were described (Fig. 1). Two of these mechanisms predict a *pro-cyclical effect*, which is a decrease in illegal drug use after the start of a recession. First, based on basic economic theory (Ruhm, 1995), one could expect decreased use of illegal drugs or use of cheaper drugs after the start of a recession, because individuals have reduced incomes and purchasing power, especially if they lose their job (Bretteville-Jensen, 2011; Catalano

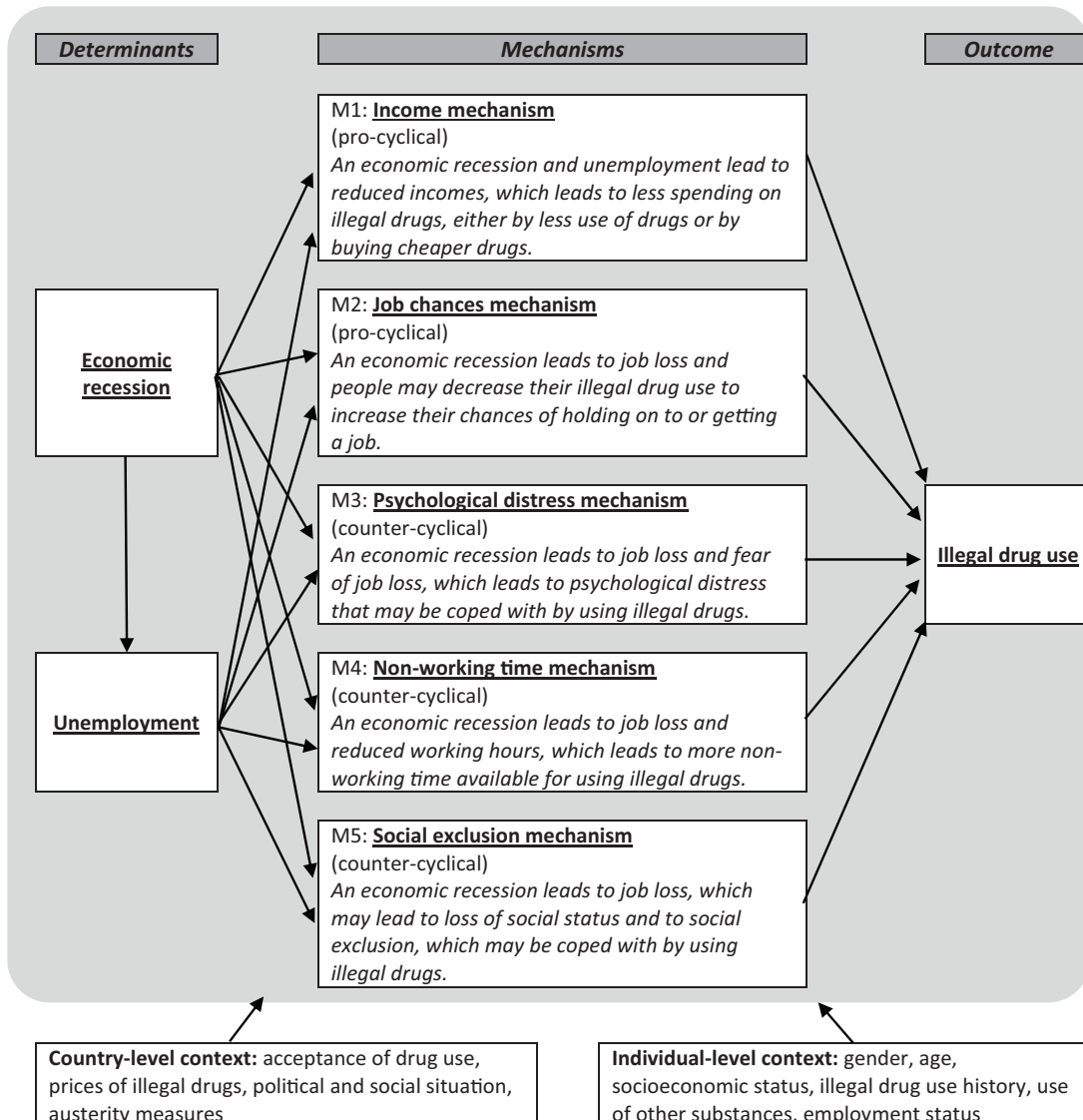


Fig. 1. Initial theoretical framework.

et al., 2011; Dubanowicz & Lemmens, 2015; Henkel, 2011; Ritter & Chalmers, 2011). Second, use of illegal drugs may decrease after the start of a recession because not using illegal drugs can increase people's chances of holding on to their job or getting a job among those who are unemployed (Catalano et al., 2011; Henkel, 2011).

The other three mechanisms predict a *counter-cyclical effect*, which is an increase in illegal drug use after the start of a recession. First, a counter-cyclical effect may occur because psychological distress increases during a recession due to people losing their job or due to fear that they will lose their job. People may cope with this stress by using drugs (Bretteville-Jensen, 2011; Catalano et al., 2011; Dubanowicz & Lemmens, 2015; Falagas et al., 2009; Henkel, 2011; Ritter & Chalmers, 2011). Second, people might lose their job during a recession or their working hours might be reduced, which causes them to have more non-working time. This increases the time available for using drugs (Bretteville-Jensen, 2011; Dubanowicz & Lemmens, 2015; Ritter & Chalmers, 2011). The final mechanism from our initial theoretical framework hypothesizes that job loss due to a recession can lead to loss of social status and to social exclusion (Dubanowicz & Lemmens, 2015). People may cope with this loss by using illegal drugs.

The initial theoretical framework also contained information about contexts (Fig. 1), because the above mechanisms may not affect all individuals in the same way. It is possible that contrasting effects occur in sub-groups within a single population experiencing the same recession. For example, effects could be different for different age groups, for males and females, for people from different socioeconomic status groups, for people who have and who do not have a history of illegal drug use, and for employed versus unemployed individuals. Additionally, it is possible that certain mechanisms take place only in some country-level contexts (De Goeij et al., 2015). The extent of social acceptance of drug use, the prices of illegal drugs, the political and social situation, and the extent of austerity measures could, for example, play a role. Contexts can also interact with mechanisms to generate different outcomes. Therefore, in addition to examining mechanisms that explain how economic recessions influence illegal drug use, it is important to examine in which individual-level and country-level contexts these mechanisms occur. Moreover, effects may differ for different types of drugs. It is also important to take these differences into account, if there is sufficient empirical evidence available to make these distinctions.

In our systematic realist literature review, we aimed to answer the following question: How do economic recessions and unemployment affect the use of illegal drugs among adults?

Methods

Search strategy

After formulating the initial theoretical framework, we performed a systematic search using a keyword-based search strategy in six databases on 15 November 2015: EconLit (which

contains literature from 1990 onwards), Embase (1974 onwards), Medline (1946 onwards), PsycINFO (1971 onwards), SocIndex (1972 onwards), and Web of Science (1950 onwards). Realist reviews often use an iterative search strategy that is refined during the review process (Wong, Westhorp, Pawson, & Greenhalgh, 2013). Our initial search used only search terms with synonyms for economic recession and illegal drug use and was used to screen relevant publications in order to obtain search terms for the five mechanisms and to verify whether we missed any individual-level mechanisms (which was not the case). The final search included keywords for economic recession and unemployment, at least one of the five mechanisms, and for the outcome illegal drug use. The keywords for illegal drug use included specific drugs such as cannabis; cocaine; ecstasy; and heroin; and more general keywords such as heavy drug use; illegal drug use; and illicit drug use. Table 1 shows all keywords used for our final search. The full search strategy is available online (Supplementary Table S1).

Selection of studies and extraction of relevant data

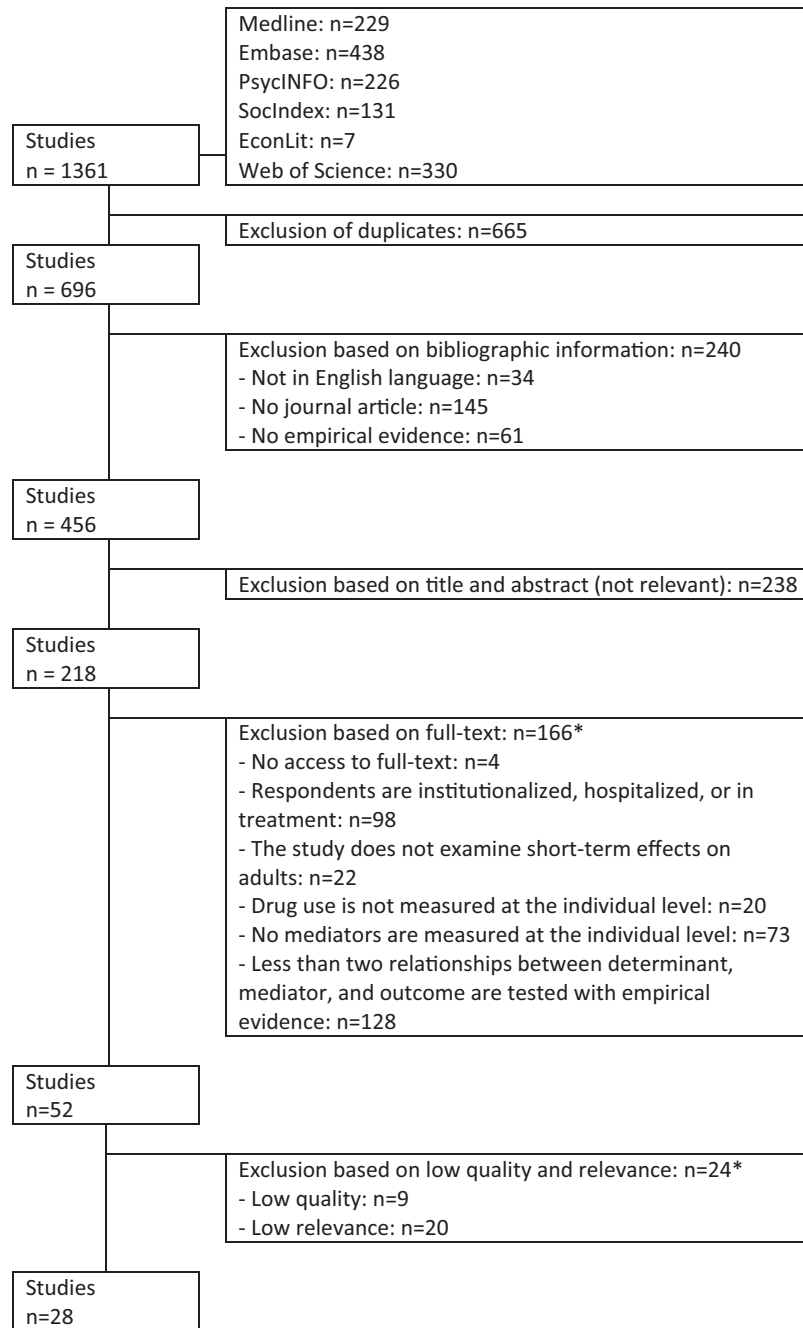
Fig. 2 shows the flow diagram of the selection of studies. The final search yielded 1361 studies published between 1970 and 2015. First, duplicate publications, publications that were not written in the English language, other publications than scientific journal articles (e.g. books and conference abstracts), and publications that did not contain empirical evidence (e.g. commentaries and review studies) were excluded. In standard systematic reviews some study designs (e.g. randomized controlled trials) are preferred over other study designs (e.g. qualitative studies). However, in realist reviewing, empirical evidence from any study design is considered important because multiple methods are needed to illuminate the richer picture of how contexts and interventions have an impact on outcomes (Pawson et al., 2005). Also, the limitation of one study can often be met with information from another study. Therefore, we included literature from any study design in our review.

After this first selection, 456 studies remained. The abstracts of those studies were coded on relevance (i.e. studies had to be about recession or unemployment and illegal drug use). The full-text of the 218 studies that were considered relevant were coded on five inclusion criteria:

- 1) Respondents are not institutionalized, hospitalized, or in treatment.
- 2) The study is about short- or medium-term effects among adults.
- 3) Drug use is measured at the individual level.
- 4) At least one of the mediators from the initial theoretical framework are present and they are measured at the individual level. Mediators were income, job chances, psychological distress, non-working time, or social exclusion.
- 5) At least two relationships between determinant, mediator, and outcome are tested with empirical evidence. Determinants were recession or unemployment and outcomes were use of

Table 1
Keywords used in systematic search.

Economic recession or unemployment	Austerity Measure*, Economic Cris*, Economic Decline*, Economic Downturn*, Economic Recession*, Financial Cris*, Financial Decline*, Financial Downturn*, Financial Recession*, Fiscal Cris*, Job loss, Loosing job, Unemploy*
Income mechanism	Economic constrain*, Income, GDP, Gross domestic product, GRP, Gross regional product, Pay*, Poverty, Wage*
Job chances mechanism	Job chance, Work chance, Job opportunit*, Work opportunit*
Psychological distress mechanism	Distress*, Strain*, Stress*, Mental health
Non-working time mechanism	Time use, Work* hour*, Work* time, Leisure-time, Leisure time
Social exclusion mechanism	Social status, Social exclusion, Social withdraw*, Social self-esteem
Illegal drug use	Amphetamine*, Cannabis*, Cocaine*, Ecstasy, Extasy, Heavy drug* use, Heroin*, Illegal drug*, Illicit drug*, Inject* drug*, Marihuana*, Marijuana*, Methamphetamine*, Xtc



* Some studies have been excluded on multiple grounds.

Fig. 2. Flow diagram of selection of studies.

illegal drugs (i.e. excluding legal use of pharmaceutical drugs, use of tobacco, and use of alcohol).

With respect to the second inclusion criterion, we only examine short- or medium-term effects because long-term effects are difficult to attribute to a recession or unemployment rather than to other life-events. Short- or medium-term is defined as five years or less. A study among adults is defined as the majority of the studied ages being 18 or older at the last studied survey wave (e.g. a study

about 14–18 year olds is not included and a study about 16–24 year olds is included). The fifth inclusion criterion meant that some included studies tested the relationship between determinant and mediator and between mediator and outcome, other included studies tested the relationship between determinant and outcome and between determinant and mediator, and some included studies tested the relationship between determinant and outcome and between mediator and outcome. Studies that tested, for example, the relationship between mediator and outcome without

considering the determinant were not included. Studies that met all five criteria were included ($n=52$).

The selection process was performed by the first author, the second author, and a research assistant independently (Cohen's Kappa = 0.57). Disagreement between codings were discussed until agreement was reached.

Relevant data on mechanisms from the 52 included studies were summarized in extraction tables by the first author. The second author checked the extraction tables. Results in the extraction tables were written as so-called context-mechanism-outcome configurations that describe in which context an economic recession or unemployment triggers individual-level mechanisms that lead to illegal drug use outcomes.

Appraisal of primary studies

The extraction tables of all included studies were independently rated by the first and second author during the appraisal process. In realist reviews, defensible judgements are made on the quality and relevance of the extracted data for the purpose of testing the theoretical framework, rather than using existing technical checklists for appraising the quality of entire studies (Wong et al., 2013).

The quality of the extracted data from the studies was rated by both coders as low, moderate, or high (Cohen's Kappa = 0.67). To make this classification for quantitative studies, we focused on study design (cross-sectional or longitudinal), size of study sample, participant selection procedure, operationalization of determinant, mediator(s), and outcome (clearly described or not), and adjustment for confounders (yes or no, for example gender, age, and health problems). To make this classification for qualitative studies, we focused on clarity of descriptions of context, description of participant selection, description of data collection and recording, description of the analyses, and on the credibility of the findings. The credibility of the findings was assessed by (re) reading the results section of the qualitative studies by both coders and judging whether the study provided sufficient original material to satisfy the reader about the relationship between data and interpretation (Green & Thorogood, 2014). The coding instruction is available online (Supplementary Table S2).

The relevance of the context-mechanism-outcome configurations was rated by both coders as low, moderate, or high (Cohen's Kappa = 0.63). To make this classification, we focused on the study population, operationalization of determinant, mediator(s), and outcome, which pathways were examined, and whether the order of the examined pathways was in line with our review question. To give some examples, studies about the general adult population or about a sample of drug users were rated as more relevant than studies about people who were just released from prison or who were in military service. Studies about unemployment-related stress and unemployment-related social exclusion were rated as more relevant than studies about general stress or general social exclusion.

Studies that were classified as low in quality and/or relevance for the purpose of our review were excluded ($n=24$).

Analysis and synthesis

We conducted a narrative synthesis of 28 studies that were published between 1990 and 2015. The narrative was structured around the mechanisms in the initial theoretical framework (income mechanism, job chances mechanism, psychological distress mechanism, non-working time mechanism, and social exclusion mechanism) and by whether or not studies used data from during an economic recession. An economic recession was defined (Claessens & Kose, 2009) as two consecutive quarters of

negative economic growth as measured by a country's real (inflation adjusted) Gross Domestic Product (Eurostat, n.d.; OECD, n.d.; Trading Economics, n.d.).

The analysis of each mechanism started with context-mechanism-outcome configurations that were coded as both high in relevance and high in quality. Subsequently, all other context-mechanism-outcome configurations were analyzed. The analyses were done by copying all these configurations to an Excel file and categorizing studies according to part of the mechanism that was examined, context, participant characteristics, operationalization of mediator, type of drugs, methodology used, and sample size. Consequently, patterns were identified by making frequent use of the realist review conceptual tools situating, reconciling, and adjudicating (Wong et al., 2013). Situating means viewing the evidence in light of the context in which it appears, for example the country in which the findings are found or the sample that is studied. Reconciling means identifying differences that explain contradictory findings. An example is that contradictory findings may be explained by different operationalizations of mediators or different types of drugs as outcomes. Adjudicating refers to taking account of the methodological quality or relevance of evidence when synthesizing findings. For example, when the hypothesized association is found in studies with large samples, but not significantly in studies with smaller samples, more weight was given to the former. The process of adjudicating meant that judgments about the relevance of context-mechanism-outcome configurations sometimes had to be adjusted during the analyses. During the analysis and synthesis process, the first and second author had regular discussions about the interpretations. The entire author team commented on several versions of the synthesis and confirmed the final synthesis.

Results

Study characteristics

An overview of the characteristics of the 28 included studies is given in Table 2. A description of the design and summary of relevant results for each individual study is given in Table 3.

Nine studies used data from during a recession (Bray, Zarkin, Dennis, & French, 2000; De Souza, Diaz, Suttmoller, & Bastos, 2002; Epele, 2010, 2011; Fergusson, McLeod, & Horwood, 2014; Kalousova & Burgard, 2014; Kramer, Booth, & Han, 2010; Melchior, Chollet, Elidemir, Galera, & Younes, 2015; Uggem & Shannon, 2014). Almost half of these studies examined respondents in the United States ($n=4$) and were longitudinal surveys ($n=4$). Nineteen studies used data that were not from during a recession but included participants who experienced unemployment (Arthur & Whitley, 2015; Atkinson, Montoya, Whitsett, Bell, & Nagy, 2003; Baggio et al., 2015; Bennett, Elliott, & Golub, 2013; Calcaterra, Beaty, Mueller, Min, & Binswanger, 2014; Cepeda et al., 2012; George, Kinner, Bruno, Degenhardt, & Dunn, 2010; Hammarström, 1994; Hammer & Vaglum, 1990; Jungerman et al., 2010; Parker, Weaver, & Calhoun, 1995; Pedersen, 2009; Rossi et al., 2011; Swift, Hall, & Teesson, 2001; Tomori et al., 2014; Topp, Hudson, & Maher, 2010; Wadsworth, Moss, Simpson, & Smith, 2004; Weston et al., 2009; Winter et al., 2015). These studies examined respondents in ten different countries, predominantly from the United States ($n=6$) and Australia ($n=4$). Almost half of these studies were cross-sectional surveys ($n=9$).

Of all examined studies, 21 used quantitative methods (Atkinson et al., 2003; Baggio et al., 2015; Bray et al., 2000; Calcaterra et al., 2014; Cepeda et al., 2012; De Souza et al., 2002; Fergusson et al., 2014; George et al., 2010; Hammer & Vaglum, 1990; Jungerman et al., 2010; Kalousova & Burgard, 2014; Kramer et al., 2010; Melchior et al., 2015; Parker et al., 1995; Pedersen,

2009; Rossi et al., 2011; Swift et al., 2001; Topp et al., 2010; Wadsworth et al., 2004; Weston et al., 2009; Winter et al., 2015), six studies used qualitative methods (Arthur & Whitley, 2015; Bennett et al., 2013; Epele 2010, 2011; Tomori et al., 2014; Uggen & Shannon, 2014), and one study used both quantitative and qualitative methods (Hammarström, 1994). The psychological distress mechanism was examined in most studies (n=17), followed by the income mechanism (n=10), while the social exclusion mechanism (n=5) and the non-working time mechanism (n=4) were studied less often. No studies examined the job chances mechanism. Most studies examined only one of the mechanisms (n=21).

Income mechanism (pro-cyclical)

Studies with data from during a recession

Six studies examined the income mechanism with data that were collected during an economic recession. Of those six studies, one qualitative study (Epele, 2010) and one quantitative study (Kalousova & Burgard, 2014) were judged to have high relevance and quality for testing the income mechanism.

The qualitative study was performed among active drug users and members of their social networks from a shantytown in Buenos Aires during the 2001–2002 recession (Epele, 2010). The

recession was regarded to have caused a reduction in resources and cash among drug users. This led to the substitution of cocaine with psychotropic pills, marijuana, free-base cocaine, and alcohol. Members of the social networks of drug users saw psychotropic pill users as people who are poor and have no resources to get high on cocaine. This study was the only one that described the broader population-level context of prices, availability, and quality of drugs. According to the interviewed drug users, the quality of cocaine deteriorated during the recession, cocaine became scarcer, and more expensive. The price was not always the main reason for switching to psychotropic pills; many former cocaine users took psychotropic pills because the quality of cocaine became so poor that they worried about the health damage caused by dangerous toxins mixed with cheaper quality cocaine. Additionally, some prescription medications became extremely scarce and people started substituting one medicine for another and took combinations of psychotropic pills with illegal drugs or alcohol when they could not get hold of the prescription medicine they needed. A related qualitative study that was performed in the same period and region found that free-base cocaine was seen as a “drug of the poor” (Epele, 2011). Free-base cocaine started to spread a few months after the start of the recession and initially had a much lower selling price than regular cocaine.

The quantitative study was performed during the aftermath of the 2007–2009 recession in Southeast Michigan (Kalousova &

Table 2
Characteristics of the included studies.

	Studies with data from during an economic recession (n=9)	Studies with data not from during an economic recession (n=19)
Examined country		
Argentina	2	1
Australia	0	4
Brazil	1	1
France	1	0
Jamaica	0	1
New Zealand	1	0
Norway	0	2
Sweden	0	1
Switzerland	0	1
United States	4	6
Vietnam	0	1
Wales	0	1
Year published		
1990–1995	0	3
1996–2000	1	0
2001–2005	1	3
2006–2010	2	5
2011–2015	5	8
Study design		
Cross-sectional survey	2	9
Longitudinal survey	4	6
Qualitative interviews	1	3
Ethnographic fieldwork	2	0
Quantitative and qualitative methods	0	1
Which mechanisms examined		
Income mechanism	6	4
Job chances mechanism	0	0
Psychological distress mechanism	3	14
Non-working time mechanism	2	2
Social exclusion mechanism	2	3
Number of mechanisms examined		
1 mechanism	6	15
2 mechanisms	2	4
3 mechanisms	1	0
4 mechanisms	0	0
5 mechanisms	0	0

Table 3
Descriptions of design and summary of relevant results of the included studies.

Reference	Location	Design	Study population	Summary of relevant results for testing our framework [including quality and relevance]
Studies performed during an economic recession				
Bray et al. (2000)	United States	Cross-sectional survey	Population aged 25–54 years who were not on active military duty, not enrolled in school, not disabled, and not retired (n = 34,805)	<ul style="list-style-type: none"> • Among men, use of marijuana and other illicit drugs with and without symptoms of dependence was associated with a lower likelihood of working full-time and less hours worked in the past month among those currently employed. In multivariate analyses, the association between marijuana use without symptoms and hours worked in the past month, the association between other illicit drug use with symptoms and working full-time, and the association between other illicit drug use with symptoms and hours worked in the past month remained significant. Among women, only the negative association between marijuana use without symptoms and working full-time was significant in multivariate analyses. [quality = high, relevance = high]
De Souza et al. (2002)	Brazil, Rio de Janeiro	Cross-sectional survey	HIV-negative men who have sex with men aged 18–50 years (n = 675)	<ul style="list-style-type: none"> • Lower income (below the poverty level) was associated with a higher likelihood of crack/cocaine use with sexual activity. [quality = moderate, relevance = moderate]
Epele (2010)	Argentina, Buenos Aires	Ethnographic fieldwork	Active drug users from a shantytown aged 18–43 years (n = 60), former drug users, and members of the users' extended social networks	<ul style="list-style-type: none"> • Among former drug users, psychotropic pill users were seen as people who are poor, marginalized, and have no resources to get high on cocaine. [quality = high, relevance = high] • Among drug users, the reduction in resources through both legal and illegal means and the dearth of cash and goods that could be traded for drugs after the start of the economic recession have fostered the substitution of cocaine with psychotropic pills, marijuana, free-base cocaine, and alcohol. According to users the substitution for cocaine by other substances was tied to the fact that cocaine was expensive and of poor quality. [quality = high, relevance = high] • Among members of the social networks of drug users, drug consumption was explained as a way to escape and forget their social and daily reality, which has become overwhelming and unbearable. [quality = high, relevance = high] • Women without a history of drug use took benzodiazepines to “calm down” and decrease anxiety, panic attacks, insomnia, and despair. [quality = high, relevance = high]
Epele (2011)	Argentina, Buenos Aires	Ethnographic fieldwork	Active drug users from three neighborhoods aged 18–45 years (n = 40)	<ul style="list-style-type: none"> • Free-base cocaine was seen as the drug “of the poor” and was used by marginalized populations. [quality = moderate, relevance = moderate]
Fergusson et al. (2014)	New Zealand, Christchurch	Longitudinal survey	A birth cohort born in Christchurch in 1977, who have been studied at ages 18, 21, 25, and 30 and have been surveyed on at least one occasion (n = 1056)	<ul style="list-style-type: none"> • Duration of unemployment was associated with a higher likelihood of major depression, but not with a higher likelihood of anxiety disorder. [quality = moderate, relevance = high]
Kalousova & Burgard (2014)	United States, Southeast Michigan	Longitudinal survey	Population aged 19–64 year who were surveyed in 2009/2010 and in 2011 (n = 914)	<ul style="list-style-type: none"> • Unemployment experience was associated with a lower median income. [quality = high, relevance = high] • Measured decrease in economic resources was not associated with adoption of marijuana. However, when unemployment, measured, and perceived decrease in economic resources were added to the same model, measured decrease in economic resources was associated with a lower likelihood of adoption of marijuana. [quality = high, relevance = high] • Higher household income was associated with a lower likelihood of adoption of marijuana. [quality = high, relevance = high]
Kramer et al. (2010)	United States, Arkansas	Longitudinal survey	Rural African American young adults aged 18–21 years who used cocaine or methamphetamine and were followed for 2 years (n = 92)	<ul style="list-style-type: none"> • Income in the past year before the recession was not associated with cocaine abuse/dependence diagnostic group during the recession. [quality = moderate, relevance = moderate]
Melchior et al. (2015)	France	Longitudinal survey	Community sample of young adults aged 18–35 years (n = 1,126)	<ul style="list-style-type: none"> • Social support was not associated with cannabis use and abuse in the past 12 months. [quality = moderate, relevance = moderate]

Table 3 (Continued)

Reference	Location	Design	Study population	Summary of relevant results for testing our framework [including quality and relevance]
Uggen & Shannon (2014)	United States, Minnesota	Qualitative individual interviews	Young adults aged 18–25 years leaving inpatient chemical dependency treatment (n = 29)	<ul style="list-style-type: none"> Anxiety or depression in the past 12 months was not associated with cannabis use and abuse in the past 12 months. [quality = moderate, relevance = moderate] Income from employment sometimes increased drug use. [quality = moderate, relevance = moderate] Employment provided stability, structure, and kept them busy, which prevented employed young adults from using drugs again. [quality = moderate, relevance = moderate] Employment provided sober peer networks, healthy social contacts, and positive social relationships. [quality = moderate, relevance = moderate]
Studies not performed during an economic recession				
Arthur & Whitley (2015)	Jamaica	Qualitative focus group interviews	Community members, patients and caregivers at outpatient mental health clinics aged 18 years and older (n = 159)	<ul style="list-style-type: none"> Financial challenges, the level of the economy, and job loss were described as a source of stress that caused mental illness. [quality = high, relevance = high]
Atkinson et al. (2003)	United States, Houston	Longitudinal survey	Female welfare recipients aged 18 years and older who were followed up at 4, 8, 12, 16, 20 and 24 months (n = 362)	<ul style="list-style-type: none"> Drug use prior to intake was associated with higher psychological distress at intake and with higher psychological distress at one year. Psychological distress at intake and one year was not associated with drug use in the following four months. [quality = moderate, relevance = moderate]
Baggio et al. (2015)	Switzerland	Longitudinal survey	Young men aged 17 to 27 years surveyed at baseline and 1–3 years later (n = 4,758)	<ul style="list-style-type: none"> Unemployment at baseline was not associated with depressive symptoms and mental disability at follow-up. However, depressive symptoms and mental disability at baseline were associated with unemployment at follow-up. [quality = high, relevance = high]
Bennett et al. (2013)	United States, New York City area	Qualitative individual interviews and focus group interviews	Recently separated, formerly enlisted (OIF-OEF) veterans living predominately in low-income neighborhoods (n = 40)	<ul style="list-style-type: none"> Substance use was a form of coping with unemployment and homelessness. [quality = high, relevance = high]
Calcaterra et al. (2014)	United States, Denver	Longitudinal survey	Former prisoners released to Denver, who were surveyed 1–3 weeks post prison release and 2–9 months after (n = 155)	<ul style="list-style-type: none"> Major depression at baseline was associated with a higher likelihood of drug use in the past month at follow-up. [quality = moderate, relevance = moderate]
Cepeda et al. (2012)	United States	Cross-sectional survey	Mexican American non-injecting heroin users aged 16–40 years (n = 300)	<ul style="list-style-type: none"> Unemployment was not associated with depression symptomatology. [quality = moderate, relevance = high] Depression symptomatology was associated with a higher likelihood of Heroin injecting transition risk. [quality = moderate, relevance = high]
George et al. (2010)	Australia	Cross-sectional survey	Regular ecstasy users aged 16 years and older (n = 740)	<ul style="list-style-type: none"> Unemployment was associated with a higher likelihood of psychological distress. [quality = moderate, relevance = high] Medium levels of psychological distress (compared to low levels) were associated with a higher likelihood of recent binge drug use and use of cannabis more than once a week. High levels of psychological distress (compared to low levels) were associated with a higher likelihood of recent binge drug use. Psychological distress was not associated with the other drug variables in multivariate analyses that adjusted for sociodemographic characteristics. [quality = moderate, relevance = high]
Hammarström (1994)	Sweden, the municipality of Luleå	Longitudinal survey	Final-year students aged 16 years at baseline and 21 years at follow-up (n = 1,060)	<ul style="list-style-type: none"> Long-term unemployment between baseline and follow-up was associated with more psychological symptoms (both among males and females at age 16 and 21). This was also found in a multivariate analysis. [quality = moderate, relevance = moderate] Long-term unemployment between baseline and follow-up was associated with a larger increase in psychological symptoms between baseline and follow-up among both males and females (not reported whether this increase is significant). [quality = moderate, relevance = moderate]
		Qualitative individual interviews	Final-year students aged 21 years who had been long-term unemployed during a 5-year period (n = 169)	<ul style="list-style-type: none"> Stress and depressive feelings were described as a consequence of unemployment. [quality = moderate, relevance = moderate]

Table 3 (Continued)

Reference	Location	Design	Study population	Summary of relevant results for testing our framework [including quality and relevance]
Hammer & Vaglum (1990)	Norway	Longitudinal survey	Young people aged 17–20 years at baseline who were followed up 2 years later (n = 1,590)	<ul style="list-style-type: none"> • Unemployment led to passivity, not wanting to go out, and isolation. [quality = moderate, relevance = moderate] • Less social integration was associated with a higher likelihood of ever use of cannabis at follow-up. Ever users of cannabis were less involved in organized activities in their leisure time, they exercised less, and they were less frequently engaged in social contacts with close friends. [quality = high, relevance = moderate] • Psychological problems at baseline and at follow-up were associated with a higher likelihood of ever use of cannabis at follow-up. This was only found for those who had used cannabis more than five times. [quality = high, relevance = high] • Psychological problems at baseline and at follow-up were not associated with continued use of cannabis at follow-up. However, among the subgroup who was unemployed at baseline, psychological problems at follow-up were associated with a higher likelihood of continued use of cannabis at follow-up. [quality = high, relevance = high]
Jungerman et al. (2010)	Brazil	Cross-sectional survey	Population aged 14–65 years (n = 3,006)	<ul style="list-style-type: none"> • Having an income of \$243 or less was not associated with cannabis use in the multivariate analysis. [quality = moderate, relevance = moderate]
Parker et al. (1995)	United States	Cross-sectional survey	Population aged 12 years and older (n = 8814)	<ul style="list-style-type: none"> • Higher income was associated with a higher likelihood of drug use, but this was not significant in multivariate analyses. This was found for all racial groups (black, Hispanic, and white). [quality = high, relevance = moderate]
Pedersen (2009)	Norway	Longitudinal survey	Young adults aged 25–31 years (n = 1360)	<ul style="list-style-type: none"> • Income was not associated with ever cannabis use, but low income was associated with a higher likelihood of cannabis use in the past 12 months. [quality = moderate, relevance = moderate]
Rossi et al. (2011)	Argentina, Buenos Aires	Cross-sectional survey	Young adults aged 21–35 years who had been active drug users in the past three years (n = 235)	<ul style="list-style-type: none"> • A decrease in mean hours per week spent at work or not working was associated with a larger increase in mean hours per week spent using drugs. Among the same group, an increase in mean hours per week spent looking for work was associated with a larger increase in mean hours per week spent using drugs. [quality = moderate, relevance = high]
Swift et al. (2001)	Australia	Cross-sectional survey	Population aged 18 years and older (n = 10,641)	<ul style="list-style-type: none"> • Affective disorders and anxiety disorders were associated with more dependent use of cannabis and with more non-dependent cannabis use in the past year in bivariate analyses. In multivariate analyses, only affective disorders were associated with more dependent use of cannabis and with more non-dependent cannabis use in the past year. [quality = high, relevance = high]
Tomori et al. (2014)	Vietnam, Hanoi	Qualitative individual interviews	Male injecting drug users released within the past 2 years from “06 centers” (n = 43)	<ul style="list-style-type: none"> • Unemployment led to social exclusion, because it limited their ability to engage in a wider network of social interactions beyond their families. [quality = high, relevance = high] • Social exclusion and stigmatization prompted episodes of drug use relapse or exacerbated struggles with drug addiction. Sometimes, social isolation in the community triggered men to meet old drug user friends, this offered support from social isolation but also prompted relapse. [quality = high, relevance = moderate] • The inability to find employment was perceived as prompting drug use relapse or exacerbating their struggles with drug addiction. Also, the psychological stress from unemployment or having a job with low pay prompted relapse. [quality = high, relevance = high] • Unemployment had a negative psychological impact, which led to pressure and stress. [quality = high, relevance = high]
Topp et al. (2010)		Cross-sectional survey	Street-based psychostimulant injectors aged 16 years or older (n = 183)	<ul style="list-style-type: none"> • Current unemployment was associated with more psychological distress in the past four weeks in a

Table 3 (Continued)

Reference	Location	Design	Study population	Summary of relevant results for testing our framework [including quality and relevance]
	Australia, Sydney, Kings Cross			bivariate analysis. In a multivariate analysis, the association was borderline significant. [quality = moderate, relevance = high] <ul style="list-style-type: none"> • A higher injection frequency in the last month, use of heroin in the last six months, use of other opiates in the last six months, more number of drugs used in the last six months, more number of drugs ever injected, more number of drugs injected in the last six months, and a lower age at first drug injecting was associated with more psychological distress in the past four weeks in bivariate analyses. All other drug use variables were not associated with psychological distress in bivariate analyses. In multivariate analyses, no drug use variables remained associated with psychological distress. [quality = moderate, relevance = high]
Wadsworth et al. (2004)	Wales, Cardiff and Merthyr Tydfil	Cross-sectional survey	Population aged 16–97 years (n = 7979)	<ul style="list-style-type: none"> • Anxiety and stress but not depression were associated with illicit drug use in the last year in bivariate analyses (direction of association not reported), but not in multivariate analyses. [quality = high, relevance = high] • Income was associated with illicit drug use in the last year in bivariate analyses (direction of association not reported), but not in multivariate analyses. [quality = high, relevance = moderate]
Weston et al. (2009)	United States, Milwaukee inner city	Cross-sectional survey	African Americans aged 20–56 years (n = 389)	<ul style="list-style-type: none"> • Part-time employment was associated with a higher likelihood of testing positive for cocaine use than full-time employment, but was not associated with cocaine use in the multivariate analysis. [quality = moderate, relevance = moderate]
Winter et al. (2015)	Australia, Queensland	Longitudinal survey	Adult prisoners who were interviewed prior to release and 1, 3, and 6 months post-release (n = 891)	<ul style="list-style-type: none"> • Very high psychological distress was associated with a higher likelihood of post-release non-fatal overdose. [quality = moderate, relevance = moderate]

Burgard, 2014). People who had been unemployed for at least one month between the two longitudinal surveys in 2009/2010 and 2011 had lower median household income at follow-up. Lower household income was associated with a higher likelihood of initiating marijuana at follow-up. The study also examined whether people experienced a decrease in economic resources between 2008 and 2010 by constructing an income-to-needs ratio. This decrease in economic resources was not associated with initiating marijuana in a bivariate analysis, but it was associated with a lower likelihood of initiating marijuana in a multivariate analysis.

A longitudinal study among rural African American young adults from Arkansas who used cocaine or methamphetamine before the 2007–2009 recession found no significant association between income and cocaine dependence (Kramer et al., 2010). However, young adults who were leaving chemical dependency treatment in Minnesota during the 2007–2009 recession explained in qualitative interviews that income from employment sometimes increased drug use (Uggen & Shannon, 2014). It was not reported in the study whether a reduction in income decreased drug use. In a cross-sectional study from Rio de Janeiro during the 1998–1999 recession among HIV-negative men who have sex with men, low income was associated with a higher likelihood of crack and/or cocaine use in combination with sexual activity (De Souza et al., 2002).

Studies with data not from during a recession

Four cross-sectional studies examined the income mechanism with data from studies about unemployment. Three of them were population surveys with a large number of respondents from the United States (Parker et al., 1995), Wales (Wadsworth et al., 2004), and Brazil (Jungerman et al., 2010). All of these studies did not find

a significant association between income and drug use in general (Parker et al., 1995; Wadsworth et al., 2004) or cannabis use (Jungerman et al., 2010).

One study did find a significant association between income and drug use. In a study among Norwegian adults, low income was associated with a higher likelihood of cannabis use in the past year (Pederson, 2009).

Psychological distress mechanism (counter-cyclical)

Studies with data from during a recession

The psychological distress mechanism was examined in three studies that were performed during an economic recession. One of these studies was coded as high in relevance and quality for testing the psychological distress mechanism (Epele, 2010). This ethnographic study reported that members of the social network of drug users in Buenos Aires described that the daily reality of drug users became overwhelming and unbearable after the start of the 2001–2003 recession. Drug consumption was seen as a way to escape and forget this reality. Additionally, women without a history of drug use reported taking benzodiazepines (with or without medical prescription) to “calm down” and decrease anxiety, panic attacks, insomnia, and despair.

The other two studies were longitudinal surveys. Fergusson et al. (2014) followed a birth cohort from New Zealand from age 18 to age 30. During these thirteen years, two recessions took place (1997–1998 and 2007–2010). It was found that a higher duration of unemployment was significantly associated with a higher likelihood of major depression, but duration of unemployment was not significantly associated with anxiety disorders. The study did not correlate major depression and anxiety disorders with drug use, it only correlated the direct effect of unemployment with drug use

(which is not the focus of this review). Among young adults from France during the 2008–2009 recession, experiencing anxiety and/or depression was not significantly associated with cannabis use nor with cannabis abuse (Melchior et al., 2015).

Studies with data not from during a recession

Fourteen studies that examined the psychological distress mechanism used data from studies about unemployment instead of recession. Two qualitative studies (Bennett et al., 2013; Tomori et al., 2014) and one quantitative longitudinal study (Hammer & Vaglum, 1990) were judged to have high relevance and quality for examining the psychological distress mechanism and examined the entire mechanism from unemployment to psychological distress to drug use. These three studies were performed in very different contexts. The first qualitative study examined recently separated, formerly enlisted Operation Iraqi Freedom – Operation Enduring Freedom (OIF-OEF) veterans living in low-income neighbourhoods of New York City (Bennett et al., 2013). The second qualitative study examined male injecting drug users from Vietnam who were just released from detainment in detoxification centers (Tomori et al., 2014). The longitudinal study examined young people aged 17–20 years in Norway, who were followed up two years later (Hammer & Vaglum, 1990). The findings from these three studies, although executed in very different contexts, were all in line with the psychological distress mechanism. The OIF-OEF veterans described drug use as a form of coping with unemployment and homelessness (Bennett et al., 2013). The male injecting drug users from Vietnam described that unemployment led to pressure and stress and that the stress prompted relapse into drug use when they were released from detainment in detoxification centers (Tomori et al., 2014). Additionally, among the subgroup of young people from Norway who were unemployed at baseline, psychological problems at follow-up were associated with a higher likelihood of continued use of cannabis at follow-up (Hammer & Vaglum, 1990). This association was not found among those who were employed at baseline.

In other studies, associations between unemployment and mediators were either positive (i.e. unemployment associated with more stress; Arthur & Whitley, 2015; George et al., 2010; Hammarström, 1994; Topp et al., 2010) or not significant (Baggio et al., 2015; Cepeda et al., 2012). There were no studies that found negative associations. The non-significant findings were found among studies that examined depressive symptoms and mental disability instead of stress as mediators. The positive associations between unemployment and mediator were found in a diverse number of countries: Jamaica (Arthur & Whitley, 2015), Australia (George et al., 2010; Topp et al., 2010), Sweden (Hammarström, 1994), the United States (Bennett et al., 2013), Vietnam (Tomori et al., 2014), and Norway (Hammer & Vaglum, 1990). And they were found among drug user samples (George et al., 2010; Tomori et al., 2014; Topp et al., 2010), young people (Hammarström, 1994; Hammer & Vaglum, 1990), veterans (Bennett et al., 2013), and community members and patients and caregivers at outpatient mental health clinics (Arthur & Whitley, 2015). Only one study reported subgroup analyses (Hammarström, 1994) and found similar effects among males and females and ages 16 and 21 years old.

Finally, associations between mediator and drug use outcomes were also examined. Associations that were found were either positive (i.e. stress associated with a higher likelihood of drug use; Calceterra et al., 2014; Cepeda et al., 2012; George et al., 2010; Swift et al., 2001; Winter et al., 2015) or not significant (Atkinson et al., 2003; George et al., 2010; Swift et al., 2001; Topp et al., 2010; Wadsworth et al., 2004). No consistent patterns were apparent in type of mediator or type of drug use outcome and whether associations were positive or non-significant. Positive associations

between mediator and drug use were found among drug users in the United States (Cepeda et al., 2012), Australia (George et al., 2010), and Vietnam (Tomori et al., 2014), among the population in Australia (Swift et al., 2001), among young people from Norway (Hammer & Vaglum, 1990), among former prisoners in the United States (Calceterra et al., 2014) and Australia (Winter et al., 2015), and among veterans in the United States (Bennett et al., 2013). No studies reported subgroup analyses. Most studies only examined associations between unemployment and mediators or between mediators and drug use outcomes. These studies were included in the review because they also examined the relationship between unemployment and drug use.

Non-working time mechanism (counter-cyclical)

Studies with data from during a recession

Two of the included studies examined the non-working time mechanism with data that were collected during an economic recession. Both studies were performed in the United States. Young adults who were leaving chemical dependency treatment in Minnesota during the 2007–2009 recession explained in qualitative interviews that when they had a job, this provided stability and structure, and it kept them busy, which prevented them from relapsing into drug use (Uggen & Shannon, 2014). A cross-sectional survey study among a large sample of working-age adults (25–54 years) during the 1990–1991 recession found significant associations between working part-time and having worked fewer hours in the past month with a higher likelihood of using marijuana and other illicit drugs, among men who were currently employed (Bray et al., 2000). Among women who were currently employed, only the association between working part-time and a higher likelihood of using marijuana was significant. The associations with having worked fewer hours in the past month and with other illicit drug use were not significant.

Studies with data not from during a recession

Two small-scale cross-sectional studies examined the non-working time mechanism with data that were not collected during an economic recession. The data from the first study were collected from 2003 to 2005 in Argentina (Rossi et al., 2011), which was soon after the end of the 2001–2002 recession. Respondents from this study were asked about their time use in a typical week at present and in a typical week three years ago. Respondents were young adults who were active drug users at the time of the study or three years ago from impoverished drug-impacted neighbourhoods. Not having a job or having experienced a decrease in mean hours per week spent at work was significantly associated with a larger increase in mean hours per week spent using drugs. An increase in mean hours per week spent looking for work was associated with a larger increase in mean hours per week spent using drugs. Although there is considerable risk of recall bias, the relevance of this study for testing the non-working time mechanism is high. The second study was performed among working-age African Americans from Milwaukee (20–56 years) and found that working part-time was associated with a higher likelihood of cocaine use in unadjusted analyses (Weston et al., 2009). In multivariate analyses, this association was no longer significant.

Social exclusion mechanism (counter-cyclical)

Studies with data from during a recession

The social exclusion mechanism was examined in two studies that were performed during an economic recession. A qualitative study among young adults leaving chemical dependency treatment in Minnesota during the 2007–2009 recession reported that respondents perceived that having a job provided sober peer

networks, healthy social contacts, and positive social relationships (Uggen & Shannon, 2014). In a longitudinal study among young adults from France during the 2008–2009 recession, social support was not associated with cannabis use and abuse (Melchior et al., 2015).

Studies with data not from during a recession

Three studies examined the social exclusion mechanism with data from studies about unemployment. Two qualitative studies found support for the fact that unemployment led to social exclusion (Hammarström, 1994; Tomori et al., 2014). Male injecting drug users who were released from detoxification centers in Vietnam reported that unemployment led to social exclusion, because it limited their ability to engage in a wider network of social interactions beyond their families (Tomori et al., 2014). Final-year Swedish female students reported that unemployment led to passivity, not wanting to go out, and isolation (Hammarström, 1994). This study did not report on a relation between social exclusion and drug use, but only on the relation between unemployment and drug use.

The qualitative study from Vietnam reported that social exclusion and stigmatization prompted episodes of drug use relapse or exacerbated struggles with drug addiction (Tomori et al., 2014). Social isolation sometimes triggered men to meet old drug user friends, which offered support from social isolation but also prompted relapse. A longitudinal study among young people aged 17–20 years from Norway showed that less social integration was associated with a higher likelihood of cannabis use at follow-up (Hammer & Vaglum, 1990).

Discussion

Based on the results of 28 empirical studies published between 1990 and 2015 we examined five individual-level mechanisms that explain how economic recessions and unemployment may affect use of illegal drugs among adults. The two mechanisms that were examined in most studies were the counter-cyclical psychological distress mechanism (17 studies) and the pro-cyclical income mechanism (10 studies).

Supportive evidence was found for the mechanism that hypothesized that recessions and unemployment increase psychological stress, which, in turn, increases illegal drug use. The findings from studies that were coded as high quality and high relevance and that examined the entire mechanism from unemployment through psychological stress to drug use all supported the hypothesized counter-cyclical psychological distress mechanism. Other studies found supportive evidence for the mechanism or non-significant results. Supportive evidence was found in a diverse set of countries (the United States, Australia, New Zealand, Norway, Sweden, Argentina, Vietnam, and Jamaica) and a diverse set of samples (e.g. drug users, young people, and the general population).

Overall, no supportive evidence was found for the pro-cyclical mechanism that recessions and unemployment decrease illegal drug use by decreasing income. Most studies did not find an association between income and drug use and some studies found results that contradicted the hypothesized mechanism. One study among the adult population from Southeast Michigan found mixed evidence (Kalousova & Burgard, 2014). Lower household income was associated with a higher likelihood of initiating marijuana, while a decrease in economic resources was associated with a lower likelihood of initiating marijuana (but only in the multivariate analysis). Two studies among people living in Argentine shantytowns found evidence for the income mechanism causing a change in the type of drugs people use, e.g. switching to cheaper pills instead of keep using expensive cocaine (Epele, 2010,

2011). Although no other empirical studies examined switching behavior among drug users, drug experts tend to agree that economic recessions could lead to switching behavior to cheaper drugs instead of ‘classic’ drugs that deteriorate in quality during a recession (Trautmann, 2013). Especially problem or dependent users may be expected to look for cheaper drug alternatives, and users may also shift to cheaper legal alternatives including alcohol or a mix of illegal drugs and alcohol. It is also possible that some drug users switch to injection of drugs to maximize the psychoactive impact (Lakhdar & Bastianic, 2011), which is a riskier administration method due to the risk of contamination with blood-borne diseases (Hagan, 1998). Because of these risks and the potential for higher rates of switching to injection among vulnerable populations, such as those with a low socioeconomic status (Lakhdar & Bastianic, 2011), it is important to examine switching behavior more closely in future studies.

Little evidence was available on the non-working time mechanism (4 studies) and the social exclusion mechanism (5 studies). Only one study of high quality and high relevance was identified for each mechanism. Most of the studies that did examine these mechanisms appeared to support the hypothesized associations. Recessions and unemployment were hypothesized to increase non-working time and social exclusion, which would in turn increase drug use. The job chances mechanism was not examined in any of the studies. It should be noted that the lack of evidence on these mechanisms does not necessarily mean that they are less relevant, they may just be studied less often. Alternatively, there could be publication bias in favor of the psychological distress and income mechanism, which may be the most intuitive mechanisms for most people.

The supportive evidence for the psychological distress mechanism was not challenged by any evidence of the opposite effect, e.g. that reduced income decreased drug use. In addition, we found some preliminary evidence that increased non-working time and increased social exclusion may also increase drug use. Thus, on this balance of evidence, we would generally expect drug use to increase during a recession. Studies that describe changes in substance use after the start of a recession mostly found increases or no changes in drug use (Colell et al., 2015; Lakhdar & Bastianic, 2011; Rossi et al., 2011). Additionally, studies that describe the relationship between unemployment and drug use mostly found positive or no associations (Arkes, 2011; Atkinson et al., 2003; Chalmers & Ritter, 2011; Colell et al., 2015; Compton, Gfroerer, Conway, & Finger, 2014; Kalousova & Burgard, 2014). The fact that sometimes no changes in drug use were found could possibly be explained by switching behavior.

We did not only aim to examine the mechanisms that explain how economic recessions and unemployment influence illegal drug use, but also wanted to identify in which individual-level and country-level contexts and for which types of drugs these mechanisms occurred. Unfortunately, subgroup differences were not reported in most of the studies and no clear patterns emerged of findings for different countries or for different subgroups. Similarly, studies often did not distinguish between different drug use outcomes. This made it impossible to draw separate conclusions about whether recessions and unemployment lead to changes in drug use experimentation, occasional use, or problem use and whether effects differ for different types of illegal drugs.

It is important to note that the mechanisms in our theoretical framework all assume that unemployment leads to substance use through mediating factors. However, reverse causality is also plausible (Lee et al., 2015). Psychological stress may not only lead to drug use, but drug use could also lead to psychological stress (Atkinson et al., 2003; Brunswick et al., 1992) and to unemployment (Atkinson et al., 2003; Uggen & Shannon, 2014). Some of the

positive associations that were found in cross-sectional studies and that we treated as supportive of our hypothesized mechanisms may actually be evidence of a different order of events or a mutually reinforcing relationship. A previous review on economic decline and health (Catalano et al., 2011) used a stricter approach than we did and excluded all studies based on cross-sectional associations. Although we did give more weight to longitudinal studies in our review (by taking the design into account in the quality assessment), we did not dismiss all cross-sectional evidence, as is in line with the realist review method (Pawson et al., 2005). There were seven quantitative longitudinal studies that examined the psychological distress mechanism. Five of these studies found results that were in line with the psychological distress mechanism (Calcaterra et al., 2014; Fergusson et al., 2014; Hammarström, 1994; Hammer & Vaglum, 1990; Winter et al., 2015). Two studies did not find significant evidence for the hypothesized mechanism but instead found evidence of depressive symptoms and mental disability at baseline being associated with unemployment at follow-up (Baggio et al., 2015) and drug use at baseline being associated with higher psychological distress at follow-up (Atkinson et al., 2003). There thus remains a need for more longitudinal studies that examine the psychological distress mechanism while also testing for reverse causality.

Recently, another systematic realist literature review examined how economic recessions affect alcohol use (De Goeij et al., 2015). The review found that alcohol use increases during recessions due to psychological stress, which was observed mainly in men. A second finding was that the volume of alcohol consumption and the number of drinks decreased during recessions due to lower individual incomes, which was found in all population subgroups across all studied countries, but the income mechanism did not change heavy and problematic drinking (De Goeij et al., 2015). The fact that we did not similarly find evidence that reduced income decreased illegal drug use may be explained by the difference in legality between the two substances. People who already engage in illegal activities when they buy illegal drugs, may feel less inhibited about using unlawful means (e.g. stealing money or selling drugs) to maintain use. However, most alcohol users may balk at resorting to illegal activities and so merely reduce use. For heavy and problematic alcohol use and for illegal drug use, we essentially found the same thing: reduced income does not reduce use. This implies that the higher addictiveness of some types of illegal drugs may also play a role.

Limitations

There were both limitations at the level of the primary studies that we used in this review and at the level of the realist synthesis that we performed.

The main limitation of the primary studies on economic recessions, unemployment, and illegal drug use is that individual-level mechanisms are often not studied. We identified only 28 studies that we could use for our review and only two of the five mechanisms from our theoretical framework were examined with sufficient evidence. Additionally, three quarters of the studies that we included examined only one mechanism. Therefore, the primary studies could not account for other mechanisms that may have been important. It is possible that results that were found for one mechanism could have been partly explained by another mechanism that was not studied. Another limitation of the primary studies is that most of them examined the influence of unemployment without examining the influence of economic recessions on employed individuals. Economic recessions may not only influence individuals by causing them to lose their jobs, but also by causing anxiety among people who fear that they will lose their jobs, causing distress among partners and children of those

who lost their job, dissatisfaction among employees who get fewer hours or different tasks, lower incomes for pensioners, better behavior among people who want to increase their chances of retaining their job, et cetera (Catalano et al., 2011; Dooley & Catalano, 1984).

A limitation of our realist synthesis is that we limited our analyses to individual-level mechanisms while there can also be relevant mechanisms at the population-level. For example, prices and availability of illegal drugs may change during an economic recession (Dubanowicz & Lemmens, 2015; Bretteville-Jensen, 2011). In our review, we have treated these population-level mechanisms as contexts for individual-level mechanisms. However, a systematic literature review of evidence for these population-level mechanisms may increase our understanding of how recessions affect illegal drug use. Another limitation is that we only included studies that examined a recession or unemployment, one of our mediators, and use of illegal drugs. Much more literature is available that examines recessions or unemployment and one of our mediators without examining drug use, and literature that examines one of our mediators and drug use without examining recessions or unemployment. We also excluded studies in which respondents were institutionalized, hospitalized, or in treatment. We have chosen not to include these studies because of the importance of using evidence from similar contexts in realist reviewing (Pawson et al., 2005; Pawson, 2006). Also, we have not taken alcohol use into account in our search nor in our analyses although the relationship between unemployment and illegal drug use may be confounded by alcohol use. Finally, for practical purposes, we included only English language journal articles from six publication databases while realist reviews often include grey literature, multiple iterative searches, and snowballing procedures (e.g. O'Campo et al., 2015; Pearson et al., 2015; Yen, Flood, Thompson, Anderson, & Wong, 2014). Therefore, we may have missed relevant evidence for testing our theoretical framework.

Implications

The fact that recessions and unemployment can increase psychological stress is already well known (Catalano et al., 2011; Lin, Shah, & Svoboda, 1995; Uutela, 2010; Van Hal, 2015; Zivin et al., 2011). In our literature review we have shown that some people may try to cope with this stress by using (more) illegal drugs. The most important implication of our findings is that during times of recession, psychological support for those who lost their job and are vulnerable to drug use (relapse) is likely to be important. Reimbursement for professional psychological support, special counselors who provide support to those who lost their job, and mental health awareness campaigns are possible interventions that may help to prevent an increase in illegal drug use during an economic recession.

Conclusion

Our systematic realist literature review found mainly supportive evidence for the mechanism that hypothesized that economic recessions and unemployment increase psychological stress, which increases illegal drug use. The evidence base related to a diversity of countries and samples (e.g. among drug users, young people, and general population samples). We also identified evidence to suggest that non-working time and social exclusion mechanisms may similarly be associated with increased drug use. We found no support for the mechanism whereby reduced incomes lead to decreasing drug use. This balance of evidence leads us to expect drug use to increase during times of economic austerity such as during a recession.

Role of funding source

This publication has been produced with the financial support of the Drug Prevention and Information Programme of the European Union, under grant agreement n° JUST/2013/DPIP/AG 4755—Looking at Economic Analyses of Drugs and Economic Recession (LEADER). Participant organizations in LEADER can be seen at: www.leader-project.net. A previous version of this review was published as part of a progress report from the LEADER Project to the European Commission. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission.

Contributors

GEN performed the literature search, coded the literature, and drafted the manuscript. She is the guarantor of the paper. KH assisted in coding the literature. All authors contributed to the design of the study. All authors revised the manuscript critically for important intellectual content and read and approved the final manuscript.

Acknowledgements

We thank Florian Klaas for his help with selecting and coding of the studies. We thank all researchers and expert reviewers involved in the LEADER Project for their valuable contributions to the contents of this review.

Professor Kaner is a senior scientist in the NIHR School of Primary Care Research and NIHR School of Public Health Research, the latter as part of Fuse which is a UKCRC Centre of Excellence in Translational Public Health Research.

Conflicts of interest

None.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.drugpo.2017.03.013>.

References

- Arkes, J. (2011). Recessions and the participation of youth in the selling and use of illegal drugs. *International Journal on Drug Policy*, 22, 335–340.
- Arthur, C. M., & Whitley, R. (2015). Head take you: Causal attributions of mental illness in Jamaica. *Transcultural Psychiatry*, 52, 115–132.
- Atkinson, J. S., Montoya, I. D., Whitsett, D. D., Bell, D. C., & Nagy, C. W. (2003). The relationship among psychological distress, employment, and drug use over time in a sample of female welfare recipients. *Journal of Community Psychology*, 31, 223–234.
- Baggio, S., Iglesias, K., Deline, S., Studer, J., Henchoz, Y., Mohler-Kuo, M., et al. (2015). Not in education, employment, or training status among young Swiss men: Longitudinal associations with mental health and substance use. *Journal of Adolescent Health*, 56, 238–243.
- Bennett, A. S., Elliott, L., & Golub, A. (2013). Opioid and other substance misuse overdose risk, and the potential for prevention among a sample of OEF/OIF veterans in New York City. *Substance Use and Misuse*, 48, 894–907.
- Bray, J. W., Zarkin, G. A., Dennis, M. L., & French, M. T. (2000). Symptoms of dependence, multiple substance use, and labor market outcomes. *American Journal of Drug and Alcohol Abuse*, 26, 77–95.
- Bretteville-Jensen, A. L. (2011). Illegal drug use and the economic recession—What can we learn from the existing research? *International Journal on Drug Policy*, 22, 353–359.
- Calcaterra, S. L., Beaty, B., Mueller, S. R., Min, S. J., & Binswanger, I. A. (2014). The association between social stressors and drug use/hazardous drinking among former prison inmates. *Journal of Substance Abuse Treatment*, 47, 41–49.
- Catalano, R., Goldman-Mellor, S., Saxton, K., Margerison-Zilko, C., Subbaraman, M., LeWinn, K., et al. (2011). The health effects of economic decline. *Annual Review of Public Health*, 32, 431–450.

- Cepeda, A., Kaplan, C., Neaigus, A., Cano, M. A., Villarreal, Y., & Valdez, A. (2012). Injecting transition risk and depression among Mexican American non-injecting heroin users. *Drug and Alcohol Dependence*, 125, S12–S17.
- Chalmers, J., & Ritter, A. (2011). The business cycle and drug use in Australia: Evidence from repeated cross-sections of individual level data. *International Journal on Drug Policy*, 22, 341–352.
- Claessens, S., & Kose, M. A. (2009). What is a recession? *Financ & Development*, 46, 52–53.
- Claessens, S., Kose, M. A., & Terrones, M. E. (2008). *What happens during recessions, crunches and bursts?* (IMF working papers; Nr. 08/274). Washington D.C: IMF.
- Colell, E., Sánchez-Niubò, A., Delclos, G. L., Benavides, F. G., & Domingo-Salvany, A. (2015). Economic crisis and changes in drug use in the Spanish economically-active population. *Addiction*, 110, 1129–1137.
- Compton, W. M., Gfroerer, J., Conway, K. P., & Finger, M. S. (2014). Unemployment and substance outcomes in the United States 2002–2010. *Drug and Alcohol Dependence*, 142, 350–353.
- De Goeij, M. C. M., Suhrcke, M., Toffolutti, V., Van de Mheen, D., Schoenmakers, T. M., & Kunst, A. E. (2015). How economic crises affect alcohol consumption and alcohol-related health problems: A realist systematic review. *Social Science & Medicine*, 131, 131–146.
- De Souza, C. T., Diaz, S., Suttmoller, F., & Bastos, F. I. (2002). The association of socioeconomic status and use of crack/cocaine with unprotected anal sex in a cohort of men who have sex with men in Rio de Janeiro, Brazil. *Journal of Acquired Immune Deficiency Syndromes*, 29, 95–100.
- Dooley, D., & Catalano, R. (1984). The epidemiology of economic stress. *American Journal of Community Psychology*, 12, 387–409.
- Dubanowicz, A., & Lemmens, P. (2015). Impact of the economic recession on addiction-prone behaviours. In P. Anderson, J. Rehm, & R. Room (Eds.), *The impact of addictive substances and behaviours on individual and societal well-being* (pp. 161–179). Oxford: Oxford University Press.
- Epele, M. E. (2010). Memory, forgetting, and economic crisis: Drug use and social fragmentation in an Argentine shantytown. *Medical Anthropology Quarterly*, 24, 22–41.
- Epele, M. E. (2011). New toxics, new poverty: A social understanding of the freebase Cocaine/Paco in Buenos Aires, Argentina. *Substance Use and Misuse*, 46, 1468–1476.
- Eurostat, n.d. Eurostat Database. Retrieved June 23, 2016 from: <http://ec.europa.eu/eurostat/data/database>.
- Falagas, M. E., Vouloumanou, E. K., Mavros, M. N., & Karageorgopoulos, D. E. (2009). Economic crises and mortality: A review of the literature. *International Journal of Clinical Practice*, 63, 1128–1135.
- Fergusson, D. M., McLeod, G. F., & Horwood, L. J. (2014). Unemployment and psychosocial outcomes to age 30: A fixed-effects regression analysis. *Australian and New Zealand Journal of Psychiatry*, 48, 735–742.
- George, J., Kinner, S. A., Bruno, R., Degenhardt, L., & Dunn, M. (2010). Contextualising psychological distress among regular ecstasy users: The importance of sociodemographic factors and patterns of drug use. *Drug and Alcohol Review*, 29, 243–249.
- Green, J., & Thorogood, N. (2014). *Qualitative methods for health research*. Thousand Oaks, CA, USA: Sage Publications Ltd.
- Hagan, H. (1998). Hepatitis C virus transmission dynamics in injection drug users. *Substance Use and Misuse*, 33, 1197–1212.
- Hammarström, A. (1994). Health consequences of youth unemployment. *Public Health*, 108, 403–412.
- Hammer, T., & Vaglum, P. (1990). Initiation, continuation or discontinuation of cannabis use in the general population. *British Journal of Addiction*, 85, 899–909.
- Henkel, D. (2011). Unemployment and substance use: A review of the literature (1990–2010). *Current Drug Abuse Reviews*, 4, 4–27.
- Jungerman, F. S., Menezes, P. R., Pinsky, I., Zaleski, M., Caetano, R., & Laranjeira, R. (2010). Prevalence of cannabis use in Brazil: Data from the I Brazilian National Alcohol Survey (BNAS). *Addictive Behaviors*, 35, 190–193.
- Kalousova, L., & Burgard, S. A. (2014). Unemployment, measured and perceived decline of economic resources: Contrasting three measures of recessionary hardships and their implications for adopting negative health behaviors. *Social Science & Medicine*, 106, 28–34.
- Kramer, T. L., Booth, B. M., & Han, X. (2010). Two-year trajectory of stimulant use in 18- to 21-year-old rural African Americans. *Substance Abuse*, 31, 12–23.
- Lakhdar, C. B., & Bastianic, T. (2011). Economic constraint and modes of consumption of addictive goods. *International Journal on Drug Policy*, 22, 360–365.
- Lee, J. O., Hill, K. G., Hartigan, L. A., Boden, J. M., Guttmanova, K., Kosterman, R., et al. (2015). Unemployment and substance use problems among young adults: Does childhood low socioeconomic status exacerbate the effect? *Social Science & Medicine*, 143, 36–44.
- Lin, R. J., Shah, C. P., & Svoboda, T. J. (1995). The impact of unemployment on health: A review of the evidence. *Canadian Medical Association Journal*, 153, 529–540.
- Melchior, M., Cholle, A., Elidemir, G., Galera, C., & Younes, N. (2015). Unemployment and substance use in young adults: Does educational attainment modify the association? *European Addiction Research*, 21, 115–123.
- Miller, N. S., Mahler, J. C., & Gold, M. S. (1991). Suicide risk associated with drug and alcohol dependence. *Journal of Addictive Diseases*, 10, 49–61.
- O'Campo, P., Molnar, A., Ng, E., Renahy, E., Mitchell, C., Shankardass, K., et al. (2015). Social welfare matters: A realist review of when, how, and why unemployment insurance impacts poverty and health. *Social Science & Medicine*, 132, 88–94.
- OECD, n.d. OECD Statistics. Retrieved June 23, 2016 from: <http://stats.oecd.org/>.
- Parker, K. D., Weaver, G., & Calhoun, T. (1995). Predictors of alcohol and drug use: A multi-ethnic comparison. *Journal Social Psychology*, 135, 581–590.

- Pawson, R., Greenhalgh, T., Harvey, G., & Walshe, K. (2005). Realist review—A new model of systematic review designed for complex policy interventions. *Journal of Health Services Research and Policy*, 10(Suppl 1), 21–34.
- Pawson, R. (2006). *Evidence-based policy: A realist perspective*. London: Sage.
- Pearson, M., Chilton, R., Wyatt, K., Abraham, C., Ford, T., Woods, H. B., et al. (2015). Implementing health promotion programmes in schools: A realist systematic review of research and experience in the United Kingdom. *Implementation Science*, 10, 149.
- Pedersen, W. (2009). Cannabis use: Subcultural opposition or social marginality? A population-based longitudinal study. *Acta Sociol*, 52, 135–148.
- Ritter, A., & Chalmers, J. (2011). The relationship between economic conditions and substance use and harm. *Drug and Alcohol Review*, 30, 1–3.
- Rossi, D., Singh, D. Z., Pawlowicz, M. P., Touze, G., Bolyard, M., Mateu-Gelabert, P., et al. (2011). Changes in time-use and drug use by young adults in poor neighbourhoods of Greater Buenos Aires, Argentina, after the political transitions of 2001–2002: Results of a survey. *Harm Reduction Journal*, 8, 2.
- Ruhm, C. J. (1995). Economic conditions and alcohol problems. *Journal of Health Economics*, 14, 583–603.
- Sinha, R. (2008). Chronic stress, drug use, and vulnerability to addiction. *Annals of the New York Academy of Sciences*, 1141, 105–130.
- Stuckler, D., Reeves, A., Karanikolos, M., & McKee, M. (2015). The health effects of the global financial crisis: Can we reconcile the differing views? A network analysis of literature across disciplines. *Health Economics Policy and Law*, 10, 83–99.
- Swift, W., Hall, W., & Teesson, M. (2001). Cannabis use and dependence among Australian adults: Results from the National Survey of Mental Health and Wellbeing. *Addiction*, 96, 737–748.
- Tomori, C., Go, V. F., Tuan, L. N., Huong, N. M., Binh, N. T., Zelaya, C. E., et al. (2014). In their perception we are addicts: Social vulnerabilities and sources of support for men released from drug treatment centers in Vietnam. *International Journal on Drug Policy*, 25, 897–904.
- Topp, L., Hudson, S. L., & Maher, L. (2010). Mental health symptoms among street-based psychostimulant injectors in Sydney's Kings Cross. *Substance Use and Misuse*, 45, 1180–1200.
- Trading, Economics, n.d. Trading Economics Indicators. Retrieved June 23, 2016 from: <http://www.tradingeconomics.com>.
- Trautmann, F. (2013). Exploring trends in the illegal drugs market and drug policy responses in the EU. In F. Trautmann, B. Kilmer, & P. Turnbull (Eds.), *Further insights into aspects of the illegal EU drugs market*, Publications Office of the European Union, Luxembourg, report 3.
- Uggen, C., & Shannon, S. K. S. (2014). Productive addicts and harm reduction: How work reduces crime—But not drug use. *Social Problems*, 61, 105–130.
- Utela, A. (2010). Economic crisis and mental health. *Current Opinion in Psychiatry*, 23, 127–130.
- Van Hal, G. (2015). The true cost of the economic crisis on psychological well-being: A review. *Journal of Psychology Research and Behavior Management*, 8, 17–25.
- Wadsworth, E. J., Moss, S. C., Simpson, S. A., & Smith, A. P. (2004). Factors associated with recreational drug use. *Journal of Psychopharmacology*, 18, 238–248.
- Weston, B. W., Krishnaswami, S., Gray, M. T., Coly, G., Kotchen, J. M., Grim, C. E., et al. (2009). Cocaine use in inner city African American research volunteers. *Journal of Addiction Medicine*, 3, 83–88.
- Winter, R. J., Stooze, M., Degenhardt, L., Hellard, M. E., Spelman, T., Jenkinson, R., et al. (2015). Incidence and predictors of non-fatal drug overdose after release from prison among people who inject drugs in Queensland, Australia. *Drug and Alcohol Dependence*, 153, 43–49.
- Wong, G., Westhorp, G., Pawson, R., & Greenhalgh, T. (2013). *Realist synthesis. RAMESES training materials*. London: University of London.
- Xu, X. (2013). The business cycle and health behaviors. *Social Science & Medicine*, 77, 126–136.
- Yen, I. H., Flood, J. F., Thompson, H., Anderson, L. A., & Wong, G. (2014). How design of places promotes or inhibits mobility of older adults: Realist synthesis of 20 years of research. *Journal of Aging and Health*, 26, 1340–1372.
- Zivin, K., Paczkowski, M., & Galea, S. (2011). Economic downturns and population mental health Research findings, gaps, challenges and priorities. *Psychological Medicine*, 41, 1343–1348.