Social Science & Medicine 131 (2015) 131–146

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Review

How economic crises affect alcohol consumption and alcohol-related health problems: A realist systematic review

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ARTICLE INFO

Article history:
Available online 18 February 2015

Keywords:
Economic crisis
Alcohol consumption
Alcohol-related health problems
Realist systematic review

ABSTRACT

Economic crises are complex events that affect behavioral patterns (including alcohol consumption) via opposing mechanisms. With this realist systematic review, we aimed to investigate evidence from studies of previous or ongoing crises on which mechanisms (How?) play a role among which individuals (Whom?). Such evidence would help understand and predict the potential impact of economic crises on alcohol consumption. Medical, psychological, social, and economic databases were used to search for peer-reviewed qualitative or quantitative empirical evidence (published January 1, 1990–May 1, 2014) linking economic crises or stressors with alcohol consumption and alcohol-related health problems. We included 35 papers, based on defined selection criteria. From these papers, we extracted evidence on mechanism(s), determinant, outcome, country-level context, and individual context. We found 16 studies that reported evidence completely covering two behavioral mechanisms by which economic crises can influence alcohol consumption and alcohol-related health problems. The first mechanism suggests that psychological distress triggered by unemployment and income reductions can increase drinking problems. The second mechanism suggests that due to tighter budget constraints, less money is spent on alcoholic beverages. Across many countries, the psychological distress mechanism was observed mainly in men. The tighter budget constraints mechanism seems to play a role in all population subgroups across all countries. For the other three mechanisms (i.e., deterioration in the social situation, fear of losing one's job, and increased non-working time), empirical evidence was scarce or absent, or had small to moderate coverage. This was also the case for important influential contextual factors described in our initial theoretical framework. This realist systematic review suggests that among men (but not among women), the net impact of economic crises will be an increase in harmful drinking. Such a different net impact between men and women could potentially contribute to growing gender-related health inequalities during a crisis.

1. Introduction

In the public health community, concerns have been expressed about negative health consequences associated with the current economic crisis in Europe (WHO, 2009). This crisis started in 2008 as a result of decreasing mortgage-backed security values during previous years in the United States (US) (Obstfeld and Rogoff). In the US this led to rising interest rates, borrower and bank defaults, and a crash in the housing and stock markets. Because many of these mortgage-backed securities were sold in Europe, this also triggered an economic crisis there. Another trigger for the European economic crisis has been the collapse of the US import

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http://dx.doi.org/10.1016/j.socscimed.2015.02.025
0277-9536/

market, which produced serious consequences for the European export market and economy (Blanchard et al., 2010). From 2008 onwards, gross domestic product (GDP) decreased, unemployment rates increased, and public budget deficits rose substantially (Eurostat, 2012). In response to the economic crisis, many European countries introduced major policy changes (Karanikolos et al., 2013), which may have influenced public health on top of the influence that the economic decline itself may have had (Stuckler and Basu, 2013).

Alcohol consumption (in terms of volume and pattern) and alcohol-related health problems (e.g., alcohol abuse, and dependence) are public health issues that can be positively or negatively affected by economic crises. Changes in alcohol consumption can have a considerable effect on public health and societal welfare (Anderson et al., 2009), as total alcohol consumption is causally related to many chronic medical conditions like cancer, mental disorders, and cardiovascular diseases (Rehm et al., 2003, 2008). Moreover, large numbers of drinking occasions and binge drinking can lead to either intentional or unintentional injuries, resulting from things such as violent behavior, suicide, homicide, and traffic accidents (Rehm et al., 2003; Taylor et al., 2008). There are also substantial indirect effects of alcohol-related health problems such as job loss, crime, and social exclusion (van Amsterdam and van den Brink, 2013).

The empirical evidence on the impact of economic crises on alcohol consumption and alcohol-related health problems is mixed. Alcohol consumption increased following the start of the economic and social transition in Russia and other Eastern European countries in the early 1990s, and this coincided with an increase in mortality and accidents (Baker, 2011; Men et al., 2003; Wojtyniak et al., 2005). This may be related to the strong binge drinking culture in Eastern Europe (Rechel et al., 2013). Moreover, the Gorbachev anti-alcohol campaign ended just before the start of the Russian transition, and this led to lower alcohol prices (Bhattacharya et al., 2013). During this same time period Finland experienced an economic crisis, which led to mass unemployment. However, in contrast with the transition in Eastern Europe, the crisis in Finland coincided with a reduction in alcohol consumption and alcohol-related mortality (Herttua et al., 2007; Hintikka et al., 1999; Valkonen et al., 2000). A reduction in alcohol consumption also followed the economic slowdown in Australia in the early 1990s (Chalmers and Ritter, 2011). The crisis in Southeast Asia in the late 1990s led to an increase in suicide rates, but alcohol consumption remained stable (Chang et al., 2009). These opposing trends support the notion that both specific characteristics of the crisis and the country-level context can influence how an economic crisis may exert an effect on alcohol consumption and alcohol-related health problems.

Economic crises can increase anxiety, stress, and depression (Wahlbeck and McDaid, 2012), for example, as a result of income reductions and/or loss of employment and the subsequent loss of social status and relationships. Two related psychological theories explain how these crises-triggered consequences could increase levels of alcohol consumption and the incidence of alcohol-related health problems. The “stress-response-dampening theory” argues that individuals consume alcohol to reduce the intensity of their response to anxiety and stress, which results in higher levels of alcohol consumption during economic crises (Sayette, 1999; Sher et al., 2007; Sher and Levenson, 1982). The “self-medication theory” argues that alcohol-related health problems may increase during economic crises because consuming alcohol to cope with such stressful situations can lead to the development of dependency in certain people (Bolton et al., 2009; Khantzian, 1997). Theories from other fields, including economics and sociology, offer different explanations. One basic economic theory suggests that income reductions will result in tighter individual budget constraints, so that less money will be spent on normal goods, including alcoholic beverages (i.e., the “income-effect theory”) (Catalano, 1997; Ruhm, 1995). According to the “non-working time theory”, a decrease in working hours (either due to job loss or fewer tasks at work) will lead to more time for social events, sports activities, and watching television. It is known that these activities are often accompanied by alcohol consumption (French et al., 2009). These theories may suggest that the impact of economic crises on alcohol consumption depends on a person's economic and social situation.

The contradictory empirical evidence and the variety of theories suggest that an economic crisis is a complex event that affects behavioral patterns (such as drinking) via various potentially opposing mechanisms. Therefore, the overall net impact is hard to predict and may well differ between countries and between subgroups within a population. To facilitate such predictions, we need evidence on which mechanisms play a role in which context and in which subgroup within a population. Such evidence would contribute to an understanding of how the current post-2008 economic crisis in Europe (but also other crises) may have had an impact on alcohol-related health problems. In addition, such evidence can help to determine which policies (e.g., increase in alcohol prices, or a restriction in alcohol availability (WHO, 2011)) can best be implemented during economic crises to change the presence of behavioral mechanisms and prevent an increase in the prevalence of excessive alcohol use. Such evidence can also be used to identify those subgroups most at risk of increased drinking during times of crisis.

In light of the above, the aim of our review was to investigate how economic crises affect levels of alcohol consumption and the incidence of alcohol-related health problems, and whom this affects. This was innovative, as little research is being done that assesses the role of specific mechanisms or tries to empirically discriminate between mechanisms (Catalano, 1997). The complexity of the topic makes a systematic review using the realist evaluation methodology (Pawson, 2006) suitable for our research question. The realist evaluation method tries to answer how, under what circumstances, and among whom certain policies or changed conditions have an effect on a specific outcome. It is a theory-driven method. First, an initial theoretical framework is constructed on how a changed condition can have an impact in a certain context and in certain subgroups within a population. The theoretical framework focuses on providing insight into the “inner workings” of a certain changed condition. Then, different types of evidence are collected to confirm, refute, or refine this initial theoretical framework. We used both quantitative and qualitative empirical evidence from different disciplines, including public health, social psychology, and economics.

2. Methods

According to Pawson (2006), a realist systematic review should follow six steps: 1) Identify the research question, 2) Formulate the initial theoretical framework, 3) Search for primary studies, 4) Select studies and appraise study quality, 5) Extract, analyze, and synthesize relevant data, and 6) Refine the theoretical framework. These six steps were applied throughout our paper. In addition, our research was guided by Realist And Meta-narrative Evidence Syntheses: Evolving Standards (RAMESES) publication standards (Wong et al., 2013).

2.1. Identifying the research question

Our initial primary research question was as follows: How did the post-2008 economic crisis affect alcohol consumption and

alcohol-related health problems in Europe, and whom did this affect? We explored key publications to assess the extent to which this question could be addressed with the available literature. As a result, we modified our primary research question in two ways. First, we extended our focus to previous crises and crises outside of Europe because not enough literature would be available otherwise. Only four of the papers included in this review investigated the post-2008 economic crisis in Europe. Furthermore, these other crises could provide relevant information on mechanisms that could be used during the process of building and refining our theory. Second, we chose to focus on the short-term effects of economic crises in the adult population (≥18 years). Crises can affect many different populations (e.g., children, adolescents, the working-age population, and pensioners) in the shorter or longer term. For example, alcohol dependence during adulthood may be a long-term effect of being exposed to financial stressors and parental alcohol-related problems during childhood. Our final research question was as follows: How did economic crises produce short-term effects on alcohol consumption and alcohol-related health problems in the adult population, and who was affected? We assumed that an economic crisis could be identified by rising unemployment rates, falling GDP, or both.

2.2. Formulating the initial theoretical framework

Information used for our initial theoretical framework was obtained through a scoping search of gray and published literature (the latter comprising mainly literature reviews (Anderson et al., 2009; Catalano, 1997; Morris et al., 2005; Stuckler et al., 2009a)). To check whether our formulated initial framework was complete we gave presentations at two meetings with about 15 experts from the field of health economics, social epidemiology, and public health (work package members from our project (SOPHIE project, 2014)) and one meeting with two experts from the field of alcohol addiction. During these meetings we presented initial drafts of our framework, to which we received comments from the experts. These comments were used to refine and complete the framework on how economic crises may exert an effect on alcohol consumption and alcohol-related health problems. According to our theoretical framework, five different mechanisms may play a role at the individual level (M1 to M5 in Fig. 1 and Table 1). Different mechanisms may play a role in different countries (country-level context: economic, political, and societal determinants) and between different subgroups within a population (individual context).

2.3. Searching for primary studies

The systematic search strategy for this realist review was developed with input from a librarian, and was executed on May 1, 2014. We searched multiple databases: three health databases (MEDLINE, Web of Science, and Embase), two psychological/social databases (PsycINFO and Sociological Abstracts), and one economic database (EconLit). We used synonyms for the determinant "economic crisis" and for the outcomes "alcohol consumption" and "alcohol-related health problems" (Table 2). The search was restricted to papers written in English, whereas no restrictions were applied to the type of publication. Papers published before 1990 (or which described a crisis that took place before 1990) were excluded, as there appeared to be little peer-reviewed empirical evidence available on the impact of economic crises before this date.

2.4. Selecting studies and appraising study quality

All titles and abstracts were scored by the first reviewer (MCMdG) to identify full text papers that were relevant for our realist systematic review. This scoring applied three criteria: 1) the title/abstract indicates an economic crisis as a determinant or context, 2) the title/abstract indicates alcohol consumption or alcohol-related health problems as an outcome, and 3) the title/abstract describes a peer-reviewed empirical research method. The latter criterion excluded commentaries, replies, letters, and discussions of books and theses. Papers that met all three criteria were included for further selection. When two of the three criteria were met, the abstract was also scored by a second reviewer (AEK). Selection of full text papers (MCMdG) was based on four additional criteria: 1) availability of full text (thus excluding conference abstracts), 2) inclusion of an adult (≥18 years) study population, 3) focus on an economic crisis after 1990, and 4) provision of empirical evidence on one or more mechanisms by which economic crises possibly exert an effect on alcohol consumption and alcohol-related health problems.

Full text papers meeting all of the criteria were assessed for scientific quality. These criteria were derived from the quality checklist developed by Spencer et al. (2003) for qualitative research and the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) quality checklist (von Elm et al., 2007) for quantitative research. Scientific quality was scored by two reviewers (MCMdG and BvdW). We focused on a clear description of the following elements: 1) research question, 2) study population, 3) collection procedures, and 4) analytical methods. When the study quality was satisfactory in all of these respects, the full text paper was included for data extraction, appraisal, and synthesis.

2.5. Extracting, analyzing, and synthesizing relevant data

We extracted information on title, authors, journal, year, study population, study design, country-level context, mechanism, determinant, outcome, individual context, results, and additional literature from the included full text papers (Appendix: Table 1).

Two reviewers (MCMdG and BvdW) independently appraised the degree of coverage of the evidence for each extracted mechanism. It was possible to extract multiple mechanisms from a single paper. We did not appraise the degree of coverage of all of the evidence reported in a paper, but only the evidence that supported or rejected that specific mechanism. We appraised the degree of coverage for two characteristics: 1) the detail in which the extracted mechanism was described in the paper, and 2) the degree to which this description was based on new evidence that was generated by the study itself. The level of detail of the mechanism descriptions was classified as either "thick" (individual economic and social situation, intermediate steps (e.g., psychological distress), and type of alcohol-related outcome were described) or "thin" (one element of the mechanism was not described). Coverage of empirical evidence was classified as "broad" when it could support or reject the entire mechanism. The coverage was "moderate" when empirical evidence described only a part of the mechanism. So, moderate classified evidence provided evidence only for the effect of economic crises on behavioral changes, or of behavioral changes on alcohol-related outcomes. Coverage of empirical evidence was classified as "small" when no evidence was given on intermediate mechanisms or when new empirical evidence was not generated by the study itself (authors refer to evidence from other studies or only speculate). Studies with small classified evidence were excluded from the results section (Appendix: Table 1).

Context-mechanism-outcome (CMO) configurations were annotated and extracted from all of the included full text papers. CMO configurations describe how a mechanism (M) leads to an outcome (O) within specific contexts and/or subgroups within a population (C). CMO configurations were the basis for refining the initial theoretical framework of this review (Pawson, 2006). An example

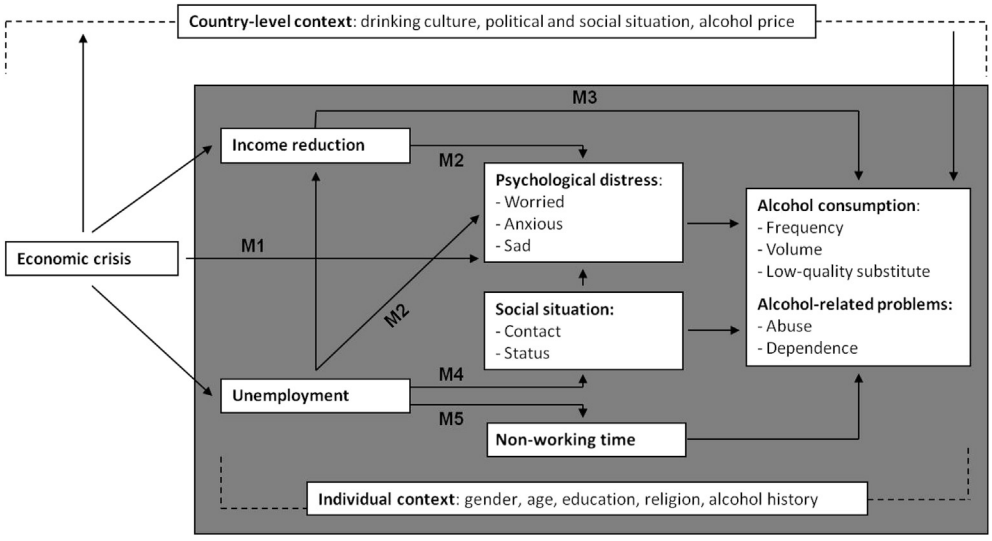

Fig. 1. Initial theoretical framework.

of a CMO configuration is that income reductions (M) caused by the "Great Recession" in the US (C) reduced the consumption of alcoholic beverages (O), but only in middle-aged men (C). The extracted CMO configurations were then clustered in accordance with our initial theoretical framework. In the example above, this CMO was included in the cluster relevant to M3 of our framework (Fig. 1).

3. Results

3.1. Selection of papers

The flow diagram in Fig. 2 shows the selection of full text papers. Of the 87 included full text papers, 45 were excluded based on the defined criteria. Five additional full text papers were included after checking the references cited in the included papers. Twelve out of the 47 included studies provided only small evidence for a mechanism, and were therefore excluded from our results section. Study characteristics are presented in Table 1 (Appendix); the studies shaded in gray were not included in our results section. Table 3 gives the number of studies providing evidence to support or reject each of the five mechanisms, and how many of these studies provided a thick description of the mechanism, how many of these provided evidence with a broad coverage, and how many had a longitudinal design.

Table 1
Initial configuration of mechanisms.

Context	Mechanism	Outcome
Country-level context: drinking culture, political and social situation, alcohol price **Individual context**: gender, age, education, religion, alcohol history	**M1** Fear of job loss or income reductions increases psychological distress (e.g., worried, anxious, sad). To cope with these feelings, more alcohol may be consumed and this may lead to more alcohol-related health problems. **M2** Actual job loss or income reductions adversely affects psychological distress (e.g., worried, anxious, sad). To cope with these feelings, more alcohol may be consumed and this may lead to more alcohol-related health problems. **M3** Income reductions result in tighter individual budget constraints. This may lead to reduced spending on alcoholic beverages, or switching to cheaper ones. **M4** Job loss adversely affects social situations (e.g., loss of social status, and social exclusion). This may lead to increases in alcohol consumption and thereby more alcohol-related health problems. **M5** Less working time and more non-working time (either due to job loss or fewer tasks at work) can increase the frequency of unhealthy activities – including alcohol consumption – both positively and negatively.	Alcohol consumption and alcohol-related health problems

3.2. Mechanisms 1 and 2: increased psychological distress

3.2.1. Mechanism

Economic stressors can cause psychological distress, including depression, anxiety, irritability, denial, and anger. Psychological distress is related to higher frequencies and volumes of alcohol consumption and to a higher prevalence of problem drinking (e.g., alcohol dependence, intoxication, and negative consequences)

Table 2
Systematic search strategy: synonyms used.

Databases	Economic crisis	Alcohol consumption and alcohol-related health problems
MEDLINE Web of Science Embase PsycINFO Sociological Abstracts EconLit	Fiscal cris* Austerit* Economic/financial AND Recession* Depression* Cris* Development* Problem* Decline* Downturn* Stress* Strain* Polic*	Alcohol* Drinking Drinker* Alcohol/drinking AND Behavio* -related disorder* -induced disorder* Disorder* Problem* Alcohol AND Beverage* Addict* Abuse* Misuse* Use* Depend* Consumption

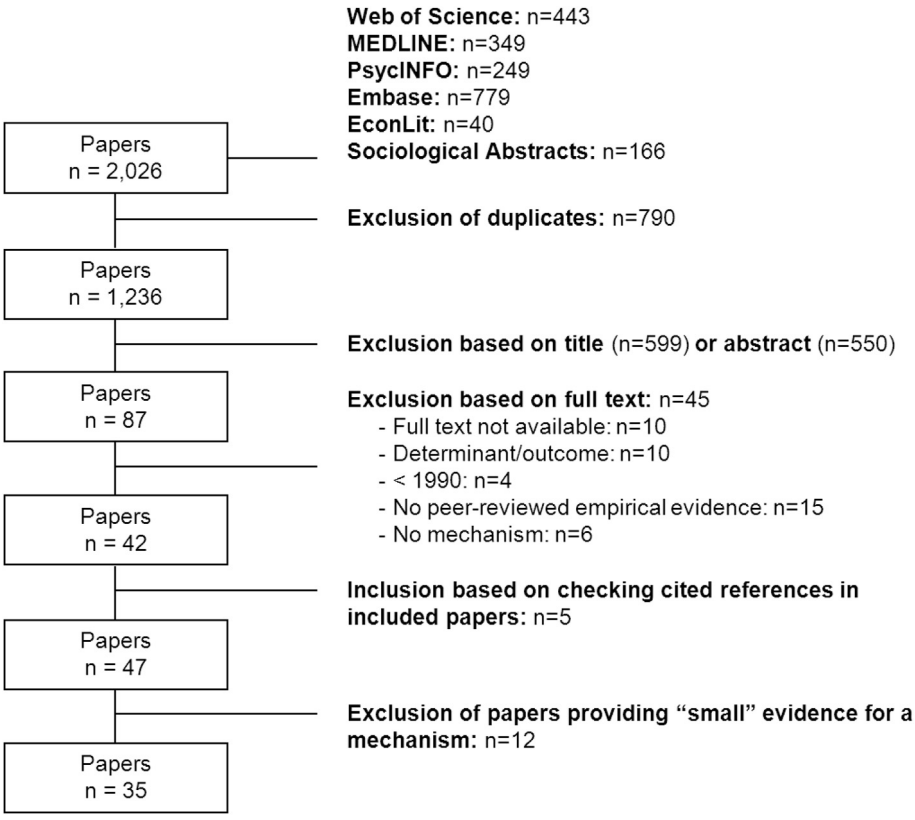

Fig. 2. Flow diagram.

(Blau et al., 2013; Brown and Richman, 2012; Cockerham et al., 2006; Hraba et al., 2000; Kalousova and Burgard, 2014; Vijayasiri et al., 2012). Stressors related to work situation (e.g., underemployment, and wage reductions), unemployment, and income can cause psychological distress. During the Czech transformation, frustration at not having enough money led to irritability and thereby more drinking problems (Hraba et al., 2000). During the post-2007 Great Recession in the US, economic stressors led to an increased frequency and volume of drinking and problem drinking through psychological distress (i.e., depression, denial, anger, and anxiety) (Blau et al., 2013; Brown and Richman, 2012; Kalousova and Burgard, 2014) and through somatic symptoms (e.g., sleep problems, stomach problems, migraines, and fatigue) (Vijayasiri et al., 2012). Somatic symptoms and psychological distress often occur together (Haug et al., 2004). During the economic and social transition in Eastern Europe, psychological symptoms (e.g., being stressed, feeling lonely, and losing confidence) and somatic symptoms (e.g., insomnia, trembling, and fatigue) were associated with a higher prevalence of frequent drinking (4–6 times per week or daily) (Cockerham et al., 2006). Moreover, during the Russian transition, economic difficulties and deterioration in material well-being coincided with poor self-rated health (Carlson, 2001), and poor self-rated health was associated with more heavy drinking (≥0.25 L of vodka on a single occasion at least once a month) (Bobak et al., 1999). In contrast, during the post-2008 economic crisis in Iceland, heavy drinking (≥5 drinks on 1 day at least once a month) decreased and remained so after controlling for anxiety and poor mental health (Asgeirsdottir et al., 2014). This shows that psychological distress remained relatively unaffected in Iceland.

Unemployment seems to be one of the most important economic stressors. A repeated cross-sectional study by Gili et al. showed that, with regard to the post-2008 economic crisis in Spain, almost one-third of the impact this had on mental health disorders (including alcohol dependence and abuse) could be explained by a rise in unemployment (Gili et al., 2013). Three further studies mentioned that psychological distress in unemployed people accumulated over time (Blau et al., 2013; Frijters et al., 2013; Garcy and Vagero, 2012). A longer duration of unemployment was correlated with greater levels of denial, anger, and depression in the US (Blau et al., 2013). Garcy et al. showed that, after becoming unemployed, the risk for alcohol-related mortality increased over time during the crisis in Sweden in the early 1990s (Garcy and Vagero, 2012). Moreover,

Table 3
Number of studies, with distinction according to detail of description, coverage of evidence, and study design.

Mechanism	N of studies	Detail of description		Coverage of evidence		Study design	
		Thin	Thick	Moderate	Broad	Cross-sectional	Longitudinal
M1 Fear of job loss or income reductions and psychological distress	0	0	0	0	0	0	0
M2 Actual job loss or income reductions and psychological distress	22	4	18	11	11	17	5
M3 Income reductions and tighter individual budget constraints	19	3	16	11	8	15	4
M4 Job loss and social situation	5	2	3	5	0	4	1
M5 Less working time and more non-working time and unhealthy activities	2	1	1	2	0	1	1

Google searches using "alcohol" (as a proxy for alcohol-related problems) started to increase 6–9 months after unemployment rates rose as a consequence of the Great Recession in the US (Frijters et al., 2013). This time lag of 6–9 months could indicate that psychological distress had accumulated over time.

At country level, it seems that the impact of unemployment on alcohol consumption and alcohol-related health problems is greater during economic crises. One repeated cross-sectional study showed that the association between unemployment and alcohol dependence and abuse was stronger during the post-2008 economic crisis in Spain than it had been before the crisis (Gili et al., 2013). The study by Herzfeld et al. (2014), showed that during the Russian transition, unemployment at the macro level was an important stressor, as alcohol consumption (in grams of pure alcohol per day) was higher in areas with high unemployment rates, among both employed and unemployed people. Opposite associations between unemployment rate and number of drinks and heavy drinking were shown in the US by Nandi et al. (2013).

3.2.2. Context

Evidence provided by studies that investigated the post-2007 Great Recession in the US and the Russian transition indicates that men seem to use drinking as a stress-releasing coping strategy more often than women. This evidence covered the entire mechanism. During the Great Recession in the US, the association between depression and anxiety and alcohol dependence was stronger in men than in women (Brown and Richman, 2012). Furthermore, somatic symptoms were associated with problem drinking among men, but not among women (Vijayasiri et al., 2012). During the transition in Eastern Europe, psychological symptoms, somatic symptoms, and poor self-rated health were related to more frequent and heavy drinking among men, but not among women (Bobak et al., 1999; Cockerham et al., 2006). In line with this, during the crisis in Sweden and Finland in the early 1990s, the Russian transition, and the Great Recession in the US, it was predominately in men that economic stressors led to more drinks, a higher frequency of drinking, more heavy drinking, more alcohol dependence, and more alcohol-related mortality (Garcy and Vagero, 2012; Jukkala et al., 2008; Luoto et al., 1998; Mulia et al., 2014; Richman et al., 2012). In addition, the impact of economic crises and unemployment on alcohol consumption and alcohol-related health problems was greatest among individuals aged 25–34 and 45–59 (Bor et al., 2013; Luoto et al., 1998), those with low educational levels (Luoto et al., 1998; Munne, 2005), single or divorced people (Luoto et al., 1998), and black people (Lo and Cheng, 2013; Zemore et al., 2013).

3.3. Mechanism 3: tighter budget constraints

3.3.1. Mechanism

Tighter budget constraints during an economic crisis due to income reductions (Carlson and Vagero, 1998; Chalmers and Ritter, 2011; Garcy and Vagero, 2012; Johansson et al., 2006; Karlsson et al., 2010; Lai and Habicht, 2011; Munne, 2005; Perlman, 2010; Tangcharoensathien et al., 2000) or price increases (Asgeirsdottir et al., 2014; Barda and Sardianou, 2010; Doran and Digiusto, 2011; Treisman, 2010) can lead to less money being spent on alcoholic beverages and thereby less alcohol consumption (including liters per capita, number of drinks consumed, frequent drinking, and heavy drinking (Asgeirsdottir et al., 2014; Barda and Sardianou, 2010; Carlson and Vagero, 1998; Chalmers and Ritter, 2011; Johansson et al., 2006; Lai and Habicht, 2011; Munne, 2005; Tangcharoensathien et al., 2000)). As a result, this could affect alcohol-related mortality at the population level (Garcy and Vagero, 2012; Treisman, 2010). Four studies showed that income reductions could not "entirely" explain the observed decreases in alcohol consumption and alcohol-related mortality. During (but not before) the crisis in Finland in the early 1990s, lower regional GDP growth was correlated with lower alcohol-related mortality (Johansson et al., 2006). The study by Asgeirsdottir et al. (2014), showed that the decrease in heavy drinking during the post-2008 economic crisis in Iceland could not be completely explained by household income reductions, loss of financial assets, or increased mortgage debt. Two other studies that investigated the post-2007 Great Recession in the US showed that reductions in alcohol consumption (quantity and frequency) could not be explained by household income reductions (Bor et al., 2013), and that these reductions occurred among both unemployed and employed people (Nandi et al., 2013). Three additional studies showed absent or contradictory associations between job loss or lost resources and harmful drinking (Kalousova and Burgard, 2014; Lo and Cheng, 2013; Zemore et al., 2013).

The other defined strategies for adjusting to tighter budget constraints are switching to cheaper alcoholic beverages (e.g., switching from liquor to wine, or from purchased alcoholic beverages to low-quality home-distilled ones) (Doran and Digiusto, 2011; Karlsson et al., 2010; Munne, 2005; Perlman, 2010) or substituting drinking in bars with drinking at home (Munne, 2005). In Finland and Australia, the consumption of distilled spirits (pure or ready to drink) decreased during crises, but wine, beer, and cider consumption increased (Doran and Digiusto, 2011; Karlsson et al., 2010). In Russia, people switched to home-distilled alcoholic beverages such as samogon (Perlman, 2010). During the economic crisis in Argentina in the late 1990s, approximately 75% of the study population mentioned that they knew people who had stopped going to bars and instead drank at their own home or at a friend's home (Munne, 2005).

3.3.2. Context

In Argentina, mainly women and people with low educational levels agreed that it is important to cut down on expenses for alcohol during economic crises (Munne, 2005). It was only during the transition in Russia that men and women turned to low-quality home-distilled alcohol (Perlman, 2010). The Russian men who switched to these low-quality alcoholic beverages were mainly 60 years of age or older, lived in rural areas, were pessimistic about their financial situation, and were heavy drinkers. In contrast, Koreans continued to drink as a leisure activity during the crisis in 1997, while they reduced other everyday expenditures (Mun-Kyum, 2005).

3.4. Mechanism 4: deterioration in the social situation

3.4.1. Mechanism

During the recent Great Recession in the US (post-2007), a change in a person's social position, such as divorce or increased social isolation, was moderately associated with more drinks consumed and strongly associated with problem drinking (i.e., drinking to intoxication, binge drinking, and past-year alcohol dependence) (Richman et al., 2012). Four other studies from the US, Albania, Russia, and Australia also showed that social isolation, change in social order or role, and loss of social status were related to more drinking (Burazeri and Kark, 2010; Jukkala et al., 2008; Kalousova and Burgard, 2014; Taylor et al., 2010).

3.4.2. Context

During the Great Recession in the US, a change in a person's social position increased the prevalence of problem drinking; this was stronger in men than in women (Richman et al., 2012). During the transition in Albania, men with a low subjectively assessed

social position were more often binge drinkers (this was not investigated in women) (Burazeri and Kark, 2010). During the transition in Russia, the association between economic problems (including forgoing social or cultural activities) and binge drinking was present in men and absent in women (most absent in married women) (Jukkala et al., 2008). During the global financial crisis in Australia, men more often reported drinking as a coping mechanism than women; women reported that family, friends, and faith helped them through tough times (Taylor et al., 2010). Based on these findings, the authors hypothesized that men are more susceptible to adverse health responses resulting from unemployment and income reductions because they can no longer fulfill their culturally defined role of family protector and provider.

3.5. Mechanism 5: more non-working time

We found no evidence to support the expectation that changes in non-working time during economic crises affect health behaviors such as drinking. Two studies provided evidence on the impact of reduced hours of "paid" work – and thus more non-working time – on alcohol consumption and alcohol-related health problems. Reduced hours of paid work did not mediate the impact of the Icelandic post-2008 economic crisis on the reduction in heavy drinking (Asgeirsdottir et al., 2014). During the post-2007 Great Recession in the US, reduced hours of paid work was associated with more negative drinking consequences and alcohol dependence (Mulia et al., 2014).

3.6. Additional mechanisms: increased responsibility and less work-related stress

Several studies described two other mechanisms (which we did not include in our initial theoretical framework). According to the first mechanism, during economic crises, employed people consume fewer drinks and drink less heavily to increase their chances of holding on to their job, and unemployed people lower their consumption to increase their chances of getting a new job (Chalmers and Ritter, 2011; Shim and Cho, 2013; Zemore et al., 2013). According to the second mechanism, a lighter workload during a crisis may lead to less stress and thereby to a reduction in alcohol consumption (Frijters et al., 2013; Johansson et al., 2006). However, neither mechanism was supported by evidence. The only evidence that could be extracted from the included studies was on the impact of crises or unemployment on alcohol-related outcomes.

4. Discussion

4.1. Refining the initial theoretical framework and the strength of evidence

Our realist systematic review has found strong empirical evidence on several crises across many countries to support two behavioral mechanisms by which economic crises may exert an effect on alcohol consumption and alcohol-related health problems. These behavioral mechanisms are increased psychological distress and tighter budget constraints.

According to the first mechanism, people may drink more when they feel anxious, depressed, and frustrated. These presentations of psychological distress can be triggered by unemployment, income reductions, or altered work situations (e.g., underemployment, and lower wages). Drinking as a coping mechanism to relieve distress was observed predominately in men, and much less so in women. In addition, evidence showed that distress in men primarily increased harmful drinking, including alcohol dependence, negative consequences of drinking, binge drinking, hazardous drinking, and intoxication. This is in line with the "self-medication theory", which suggests that drinking to cope with stressful situations may increase alcohol dependence in certain people (Bolton et al., 2009; Khantzian, 1997).

The second mechanism that is often used is to spend less money on alcoholic beverages during times of financial hardship. The evidence indicates that this mechanism is used by people across all countries and in nearly all subgroups within a population. This is in line with the basic theory of economics that individual budget constraints will result in less money being spent on normal goods ("income-effect theory") (Catalano, 1997; Ruhm, 1995). More specifically, the evidence mainly showed a reduction in the volume of alcohol consumption and number of drinks rather than a reduction in heavy and problematic drinking.

Unfortunately, there was no strong evidence to support the other three behavioral mechanisms described in our initial theoretical framework – deterioration in the social situation, fear of losing one's job, and increased non-working time – but only evidence with moderate coverage. This was also the case for potentially influential contextual factors (e.g., age, education, and marital status). Therefore, less weight can be given to this evidence.

4.2. Limitations of the included studies

In many of the included studies, the descriptions provided for how economic crises may affect alcohol consumption and alcohol-related health problems at the individual level were classified as thick. However, we found strong supporting evidence only for the mechanisms psychological distress (mainly in men) and tighter budget constraints. For the psychological distress mechanism, evidence supported the entire mechanism, from individual economic changes to psychological distress, and from psychological distress to alcohol-related outcomes. However, little evidence was extracted from studies that included longitudinal individual level data. This reduces the strength of the evidence on causal relationships underlying these two reported mechanisms. As for the association between psychological distress and alcohol consumption, individuals who consume large amounts of alcohol might also become more distressed.

As mentioned previously, there was no empirical evidence for three other behavioral mechanisms, that is fear of losing one's job, responsibility for holding on to their job or getting a new job, and less work-related stress. Evidence had moderate coverage for potentially influential contextual factors (e.g., age, education, and marital status) and for the behavioral mechanisms of deterioration in the social situation and increased non-working time. This moderate evidence could not support the entire mechanism, from the crisis or economic stressors to deterioration in the social situation or increased non-working time, followed by changes in alcohol-related outcomes.

4.3. Limitations of our realist systematic review

The explanatory evidence of our realist systematic review can help to determine which policies can best be implemented in times of economic crises, and to formulate hypotheses for further research. However, a limitation of the realist evaluation methodology is that the process of finding, extracting, analyzing, and synthesizing evidence cannot be pre-structured to the same extent as traditional approaches and that therefore the outcomes may be more dependent on the choices that authors make.

For example, we excluded studies that investigated the impact of unemployment, income reductions, and price increases on alcohol consumption and alcohol-related health problems outside the context of an economic crisis. We did so because when a crisis occurs, this can influence the impact of economic stressors on

alcohol consumption. Several studies showed that during a crisis, economic stressors had a stronger impact on alcohol-related outcomes than before the crisis (Gili et al., 2013; Harhay et al., 2013; Johansson et al., 2006). A limitation of this restriction is that we may have missed descriptions of how economic stressors might affect alcohol consumption and alcohol-related health problems, or relevant cited references. Another choice that could have influenced our review is that only papers written in English were included, which might have led to information bias.

4.4. Implications

The post-2008 economic crisis in Europe is characterized by rising unemployment rates and tighter budget constraints. Some countries have been adopting austerity measures (Karanikolos et al., 2013), which can aggravate or alleviate financial strain among individuals. It is hard to establish what the overall net impact of the post-2008 economic crisis is on trends in alcohol consumption at the population level. Moreover, our review showed that two contradictory mechanisms come into play during such difficult times. In Iceland (Asgeirsdottir et al., 2014), heavy drinking decreased after the start of the crisis, while in Spain (Gili et al., 2013), alcohol abuse and dependence increased. Initial results from Europe presented in a World Health Organization (WHO) report (Shield et al., 2013) suggest no trend changes in alcohol consumption between 2008 and 2010.

The impact of the post-2008 and other economic crises could also differ between subgroups within a country. Austerity measures – such as budget cuts to social welfare and healthcare – mainly affect people with a low income and a low educational level. The combination of low income and less financial support may dramatically increase psychological distress in lower socioeconomic groups. The evidence presented in this review indicates that, in addition to men, those with low educational levels and single or divorced people are also more likely to use drinking as a coping mechanism to deal with stress. In accordance with the "self-medication theory" (Bolton et al., 2009; Carrigan and Randall, 2003; Khantzian, 1985, 1997), drinking to cope with stressful situations can lead to harmful drinking and alcohol dependence. Therefore, this may have resulted in a substantial increase in alcohol-related health problems among the aforementioned specific subgroups within a population. Although according to the "income-effect theory" alcohol consumption may decrease in the population as a whole, these differential effects between subgroups may contribute to growing health inequalities during an economic crisis.

4.5. Future research

Based on this realist systematic review, we formulate three recommendations for future research. First, data should come from individual-level longitudinal studies that specifically aim to investigate which mechanisms play a role in which subgroups within a population. Evidence from longitudinal studies supporting all subsequent steps of the mechanisms described in our initial framework is scarce and the evidence that is available did not always focus on possible differences between subgroups. Second, in line with our first recommendation, it is very important to carry out international comparative studies. In our review, we could not locate any study that compared mechanisms between countries. Such evidence can be used to better understand and/or assess the possible impact of the European post-2008 economic crisis (but also other crises) on Europe as a whole and on individual countries. Third, it is important to investigate whether the impact of the post-2008 or other economic crises on alcohol consumption and alcohol-related health problems vary between socioeconomic groups because our results indicated such differential effects.

5. Conclusion

More evidence is needed on how economic crises may exert an effect on alcohol-related outcomes. Although, we can conclude from this realist review that two opposing mechanisms may come into play during a crisis: reductions in alcohol consumption due to tighter budget constraints and a rise in harmful drinking due to increased psychological distress. The net impact among men seems to be an increase in levels of harmful drinking and in the incidence of alcohol-related health problems, possibly contributing to growing gender-related health inequalities during economic crises.

Acknowledgments

The authors gratefully acknowledge Bregje van der Wouden for reviewing the quality of the included studies and coverage of evidence for the extracted mechanisms. This research was part of the SOPHIE project, which received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement number 278173.

Appendix

Table 1
Study characteristics.

Author(s), year, journal	Country	Context of country	Mechanism	Determinant/outcome	Study population	Results	Degree of coverage[a]
Asgeirsdottir et al., 2014, Economics and Human Biology	Iceland	Post-2008 economic crisis, Strong social support system	Psychological distress; Budget constraints; Non-working time (=thin/moderate); Social situation (=thin/small)	Post-2008 economic crisis and real price increase (*macro*)/Heavy drinking; ≥5 drinks on one day, ≥1 times a month during last year (*micro*)	General population: 18–79 years	Economic crisis (only in men; effect is not mediated through hours of work, real household income, loss in financial assets, increased mortgage debt, or anxiety/poor mental health) and real price increase led to a reduction in heavy drinking	Evidence: thick/broad Study design: longitudinal (survey)
Baker, 2011, Journal of Trauma	Russia	Economic and social transition (>1990), Strong binge drinking culture	Psychological distress	Transition 1991–1994 (macro)/Alcohol consumption per capita and alcohol-related mortality (macro)	General population	Increased alcohol consumption after transition, which coincides with mortality caused by accidents and adverse effects	Evidence: thin/small Study design: repeated cross-sectional (country statistics)

Table 1 (*continued*)

Author(s), year, journal	Country	Context of country	Mechanism	Determinant/outcome	Study population	Results	Degree of coverage[a]
Barda and Sardianou, 2010, International Journal of Consumer Studies	Greece	Post-2008 economic crisis	Budget constraints	Price increase (*macro*)/ Alcohol purchasing (*micro*)	General population: > 18 years and income earner	Price increase was related to a reduction in the purchase of alcoholic beverages because of the increased cost (mainly due to lower individual income)	Evidence: thick/ broad Study design: cross-sectional (survey)
Bhattacharya et al., 2013, American Economic Journal-Applied Economics	Russia	Economic and social transition (>1990); Strong binge drinking culture	Psychological distress	Demise of Gorbachev Campaign in 1988 (macro)/Alcohol-related mortality (macro)	General population	Demise of campaign measures (high price, subsidizing leisure activity, better healthcare and healthcare education) led to an increase in alcohol-related mortality	Evidence: thick/ small Study design: repeated cross-sectional (country statistics)
Blau et al., 2013, Journal of Workplace Behavioral Health	United States	Post-2007 Great Recession	Psychological distress	Duration of unemployment, base salary when laid off, financial strain (*micro*)/ Alcohol consumption; number of drinks per day; and binge drinking; ≥5 drinks on one occasion (*micro*)	Unemployed population (job seeking persons)	Longer duration of unemployment and financial strain is correlated with more psychological distress (denial, anger, and depression) and psychological distress is correlated with more drinking. Higher base salary when laid off is associated with more drinking.	Evidence: thick/ broad Study design: cross-sectional (survey)
Bobak et al., 1999, Addiction	Russia	Economic and social transition (1996)	Budget constraints (=small); Psychological distress	Self-rated health and unemployment (*micro*)/ drinking ≥1 a month and ≥0.25 L vodka on one occasion ≥1 a month (*micro*)	General population: ≥18 years	During the transition, poor self-rated health was associated with more drinking in men, but less drinking in women. Unemployment in men led to more drinking.	Evidence: thick/ broad Study design: cross-sectional (survey)
Bor et al., 2013, Alcohol and Alcoholism	United States	Post-2007 Great Recession	Psychological distress; Budget constraints	Post-2007 Great Recession (*macro*)/ Abstinence; during last month; alcohol consumption; drinks/ month; and frequent binge drinking; ≥5 (men) or ≥4 (women) drinks on one occasion, ≥4 times during last month (*micro*)	General population: ≥18 years	Increase in abstinence (only in young persons, women, individuals with low-educational levels), alcohol consumption, and frequent binge drinking (strongest in those 25–34/55–59 years); not mediated by household income or unemployment	Evidence: thick/ broad Study design: repeated cross-sectional (survey)
Brown and Richman, 2012, Journal of Studies on Alcohol and Drugs	United States	Post-2007 Great Recession	Psychological distress	Economy-related stressors; home ownership problems, undesirable living situation, problematic employment situation, un/underemployment, inadequate health insurance, social role constraints, inadequate sick time (*micro*)/ Drinking pattern; quantity and frequency during last month; and alcohol dependence during last year (*micro*)	General population: ≥18 years	Economy-related stressors were associated with more drinking and alcohol dependence, partly via increased psychological distress, including depressive symptoms and anxiety (effect of psychological distress on alcohol dependence is stronger in men than in women)	Evidence: thick/ broad Study design: cross-sectional (survey)
Burazeri and Kark, 2010, Alcohol and Alcoholism	Albania	Economic and social transition (2003–2006); Lower binge drinking culture than other former Communist countries	Social situation	Financial loss due to collapse pyramid schemes and unemployment (*micro*)/ Binge drinking; drunk, hangover, ≥2 drinks on one short drinking session, ≥1 times during last year (*micro*)	General population: 35–74 years	Men with low educational levels, financial loss, or low subjective social position were more often binge drinkers, which was not the case for those unemployed	Evidence: thin/ moderate Study design: cross-sectional (interview)

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Table 1 (*continued*)

Author(s), year, journal	Country	Context of country	Mechanism	Determinant/outcome	Study population	Results	Degree of coverage[a]
Carlson and Vagero, 1998, European Journal of Public Health	Russia	Economic and social transition (1993–1994); Strong binge drinking culture	Psychological distress (=small); Budget constraints; Social situation (=small)	Income inequality (*macro*) and household-adjusted income (*micro*)/Alcohol consumption per capita (*macro*) and heavy drinking; ≥0.5 L (≥160 g of pure alcohol) per week (*micro*)	Taganrog population: 25–54 years	Increase in income inequality and total alcohol consumption coincide at the country-level; Men with a low household-adjusted income less often drink heavy	Evidence: thin/broad Study design: cross-sectional (interview)
Carlson, 2001, Journal of Epidemiology and Community Health	Russia	Economic and social transition (1998)	Psychological distress	Economic difficulties; need of external help; and material well-being (*micro*)/Self-rated health and heavy drinking; ≥ 0.5 L per week (*micro*)	Taganrog population: ≥18 years	Economic difficulties and deteriorated material well-being coincided with poor self-rated health. Economic difficulties also were related to heavier drinking.	Evidence: thick/moderate Study design: cross-sectional (interview)
Chalmers and Ritter, 2011, International Journal of Drug Policy	Australia	Economic slowdown (1991–1993); higher unemployment rate	Psychological distress (=small); Budget constraints; Responsibility (=small)	Income per capita and unemployment rate (*macro*)/Frequency of drinking; weekly or more and daily (*micro*)	General population: 14–49 years	Higher income per capita was associated with a higher prevalence of weekly or more and daily drinking (only in those 14–24 years) and a higher unemployment rate was related to less weekly or more drinking (strongest in persons aged 25–49 years)	Evidence: thick/moderate Study design: repeated cross-sectional (survey)
Chang et al., 2009, Social Science and Medicine	Southeast Asia	Economic crisis (1997–1998)	Psychological distress; Social situation	GDP per capita and unemployment rate (macro)/Alcohol consumption per capita (macro)	General population: ≥ 15 years	Economic crisis did not change alcohol consumption (only suicide rates increased)	Evidence: thin/small Study design: repeated cross-sectional (country statistics)
Cockerham et al., 2006, Social Science and Medicine	Eastern Europe	Economic and social transition (2001)	Psychological distress	Psychological distress; stressed, lonely, losing confidence; and physical distress; insomnia, trembling, fatigue (*micro*)/ Frequent drinking; 4–6 times per week or daily (*micro*)	General population: ≥18 years	During the transition women experienced more psychological and physical distress than men. Only in men, psychological and physical distress was related to more frequent drinking.	Evidence: thick/broad Study design: cross-sectional (interview)
Doran and Digiusto, 2011, Drug and Alcohol Review	Australia	Global financial crisis (≥2007)	Budget constraints	Alcopops tax (*macro*)/ Alcohol consumption per capita (*macro*)	General population	Tax increase in context of the global financial crisis led to a reduced consumption of spirit-based ready to drink beverages (L per capita), but the consumption of spirits, wine, cider, and beer increased	Evidence: thick/moderate Study design: repeated cross-sectional (country statistics)
Frijters et al., 2013, Social Science and Medicine	United States	Post-2007 Great Recession	Psychological distress; Work-related stress (=small)	Unemployment rate (*macro*)/Alcohol-searches on Google (*macro*)	General population	Alcohol searches increased 6–9 months after the start of the recession, which is characterized by rising unemployment rates (strongest for those long-term unemployed and weakest in religious states)	Evidence: thick/moderate Study design: repeated cross-sectional (internet searches and country statistics)
Garcy and Vagero, 2012, Social Science and Medicine	Sweden	Economic recession (1992–1996)	Psychological distress; Budget constraints	Duration of unemployment (*micro*)/ Alcohol-related mortality (*micro*)	Working population born between 1931 and 1965 and still alive in 1996	Risk of alcohol disease-related mortality continuously increased after becoming unemployed (more present in men) and decreased after 3 years of unemployment in men.	Evidence: thick/moderate Study design: longitudinal (registry)

Table 1 (*continued*)

Author(s), year, journal	Country	Context of country	Mechanism	Determinant/outcome	Study population	Results	Degree of coverage[a]
Gili et al., 2013, European Journal of Public Health	Spain	Post-2008 economic crisis	Psychological distress	Post-2008 economic crisis (*macro*) and unemployment (*micro*)/ Alcohol abuse and dependence (*micro*)	Primary care patients	Alcohol abuse and dependence increased during the crisis; Unemployed persons have a higher risk for alcohol abuse (only during the crisis: unemployment explains 1/3 of the crisis effect)	Evidence: thin/ moderate Study design: repeated cross-sectional (survey)
Herttua et al., 2007, Alcohol and Alcoholism	Finland	Economic depression (1991–1995); Large scale unemployment	Budget constraints	Economic depression (1991–1995) (macro)/ Alcohol consumption per capita (macro) and alcohol-related mortality (micro)	General population: ≥15 years	Economic depression led to a reduction in alcohol consumption (in both men and women) and a reduction in alcohol-related mortality (only in men aged <60 years or with low/moderate educational levels, and in women aged ≥60 years)	Evidence: thick/ small Study design: longitudinal (registry)
Herzfeld et al., 2014, Economics and Human Biology	Russia	Economic and social transition (1994–2005); High alcohol prices	Psychological distress	Unemployment rate (*macro*) and individual unemployment (*micro*)/ Alcohol consumption; grams pure alcohol per day during the last month (*micro*)	General population: ≥ 18 years	During the transition, in areas with higher unemployment rates, alcohol consumption was higher, both among employed and unemployed persons (but only in persons aged > 50 years)	Evidence: thick/ moderate Study design: longitudinal (survey)
Hintikka et al., 1999, Scandinavian Journal of Public Health	Finland	Economic recession (1990–1995)	Social situation	GDP per capita and unemployment rate (macro)/Alcohol consumption per capita (macro)	General population	Increase in GDP per capita resulted in more alcohol consumption and a higher unemployment rate resulted in less alcohol consumption	Evidence: thin/ small Study design: repeated cross-sectional (country statistics)
Hraba et al., 2000, Journal of Marriage and Family	Czech Republic	Economic and social transition (1994–1996)	Psychological distress	Economic stressors; having financial problems, experiencing economic strain, making economic adjustments (*micro*)/ Drinking problems: amount, negative consequences, criticized for drinking, attempted to cut down or stop drinking (*micro*)	General population: adults	Economic stressors led to a higher risk-taking behavior, including drinking problems, and this relation is partly explained by increased feelings of irritability	Evidence: thick/ broad Study design: longitudinal (survey)
Hyyppä, 1997, Social Science and Medicine	Finland	Economic recession (early 1990s); Alcohol policy changes (1995)	Social situation	Economic recession (1991–1995) (macro)/ Physical symptoms and frequency of alcohol consumption; ≥ 3 times per week (micro)	General population: adults	Frequency of alcohol consumption was higher during than before the crisis (both in men/ women and blue/white collar workers; only in men aged 50–60). Physical symptoms (e.g., sleeping problems and chronic diseases) were also slightly higher during the crisis.	Evidence: thin/ small Study design: longitudinal (survey)
Johansson et al., 2006, European Journal of Health Economics	Finland	Great depression (early 1990s); High taxes	Psychological distress (=thin/ small); Budget constraints; Work-related stress (=small)	Great depression (early 1990s), GDP per capita, and employment rate (*macro*)/Alcohol-related mortality (*macro*) and alcohol consumption; number of drinks during last week (*micro*)	General population: 15–64 years	Great depression led to a reduction in the number of drinks and alcohol-related mortality (mediated by employment rate; outside depression, employment rate is weaker associated with consumption and reversely associated with mortality)) and a higher GDP was associated with more drinks (both during as outside the depression)	Evidence: thick/ moderate Study design: repeated cross-sectional (survey and country statistics)

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Table 1 (*continued*)

Author(s), year, journal	Country	Context of country	Mechanism	Determinant/outcome	Study population	Results	Degree of coverage[a]
Jukkala et al., 2008, Social Science and Medicine	Russia	Economic and social transition (2004)	Psychological distress (=thin); Social situation	Economic problems; needed help to pay rent, trouble buying food or clothing, refrain from social or cultural activities (*micro*)/Binge drinking; ≥80 g (men) or ≥60 g (women) of pure ethanol on one occasion, ≥1 times per month (*micro*)	Moscow population: ≥18 years	Economic problems were associated with a higher prevalence of binge drinking (only in men) and marriage/less contact with friends was related to a lower prevalence of binge drinking in women	Evidence: thick/moderate Study design: cross-sectional (interview)
Kalousova and Burgard, 2014, Social Science and Medicine	United States	Post-2007 Great Recession	Psychological distress; Budget constraints (absent/contradictory association); Social situation (=moderate)	Unemployment, measured loss of economic resources, perceived loss of economic resources (*micro*)/Onset of hazardous or harmful drinking (*micro*)	Michigan population: 19–64 years	Only the perceived loss of economic resources, but not unemployment and measured loss of economic resources, resulted in the onset of heavy and hazardous drinking	Evidence: thick/broad Study design: longitudinal (survey)
Karlsson et al., 2010, Nordic Studies on Alcohol and Drugs	Finland	Economic recession (early 1990s); Policy (high taxes and restriction on advertisement); Strong binge drinking culture	Budget constraints	Economic recession (early 1990s) (*macro*)/Alcohol consumption per capita (*macro*)	General population	Economic recession led to a reduction in alcohol consumption (mainly distilled spirits and strong beers; increase in wine and medium-strength beers)	Evidence: thick/moderate Study design: repeated cross-sectional (country statistics)
Lai and Habicht, 2011, Alcohol and Alcoholism	Estonia	Post-2008 economic crisis; Strong binge drinking culture (mainly strong spirits); Increase in taxes on alcohol	Budget constraints	Post-2008 economic crisis (*macro*)/Alcohol consumption per capita (*macro*)	General population	Economic crisis led to a reduction in alcohol consumption, which coincided with lower affordability (reduction in GDP per capita and thereby L of beer for average monthly salary)	Evidence: thick/moderate Study design: repeated cross-sectional (country statistics)
Lo and Cheng, 2013, Drug and Alcohol Dependence	United States	Post-2007 Great Recession	Psychological distress; Budget constraints (=thin, absent/contradictory association)	Post-2007 Great Recession and unemployment rate (*macro*)/Number of drinks (on a day a person drinks) and number of days a person drinks 5 or more glasses (*micro*)	Heavy drinkers	Start of the crisis and higher unemployment rates led to more days of drinking 5 or more glasses (only among black and white males and females) but a reduction in number of drinks (only among black and Asian females).	Evidence: thick/moderate Study design: repeated cross-sectional (survey)
Luoto et al., 1998, International Journal of Epidemiology	Finland	Economic recession (early 1990s)	Psychological distress	Economic recession (1991–1995) (*macro*) and unemployment (*micro*)/Abstention; during last year; and alcohol consumption; number of drinks during last week (*micro*)	General population: 18–64 years	Economic recession led to a reduction in abstention (strongest in unemployed men); The unemployed consume more drinks than the employed during the recession (for men in those aged 18–54, with low/middle –educational levels, or single) and for women in those aged 25–34 years, with middle –educational levels, or divorced)), but also before the recession (in men aged 18–44, with low/middle –educational levels, or single/divorced))	Evidence: thick/moderate Study design: repeated cross-sectional (survey)

Table 1 (*continued*)

Author(s), year, journal	Country	Context of country	Mechanism	Determinant/outcome	Study population	Results	Degree of coverage[a]
Mäkelä, 1999, Contemporary Drug Problems	Finland	Economic recession (early 1990s)	Psychological distress; Budget constraints	Economic recession (early 1990s) (macro)/ Alcohol consumption; unrecorded and recorded (macro); and alcohol-related mortality (micro)	General population: 15–74 years	Alcohol consumption decreased and alcohol-related mortality decreased (only in men; strongest in those aged 15–44 years and persons with low socioeconomic status) after the economic recession started.	Evidence: thick/ small Study design: repeated cross-sectional (registry)
Men et al., 2003, British Medical Journal	Russia	Second economic crisis (late 1990s)	Psychological distress	Second economic crisis (1998–2001) (macro)/ Alcohol-related mortality (macro)	General population: 15–69 years	Second economic crisis led to increased alcohol-related mortality (mainly among men aged 35–69) in all Russian regions	Evidence: thin/ small Study design: repeated cross-sectional (country statistics)
Mulia et al., 2014, Alcoholism: Clinical and Experimental Research	United States	Post-2007 Great Recession	Psychological distress; Non-working time (=moderate)	Self-assessed household economic losses; hours or pay reduced, job loss, trouble paying rent or mortgage, lost housing, and lost retirement savings (*micro*)/ Volume, drinking to drunkenness, negative drinking consequences, alcohol dependence (*micro*)	General population: ≥ 18 years	Economic losses during the post-2007 Great Recession were associated with more negative drinking consequences and alcohol dependence (except for lost retirement savings and to a lesser extent for reduced hours paid; only in men and mainly among persons aged 30–49 years)	Evidence: thick/ broad Study design: cross-sectional (survey)
Mun-Kyum, 2005, Korea Journal	Korea	Financial crisis (1997)	Psychological distress (=small); Budget constraints	Financial crisis (1997) (*macro*)/Alcohol drinking as leisure activity (*macro*)	General population	Persons maintained drinking as leisure activity during the crisis, while they reduced other items of everyday expenditure	Evidence: thin/ moderate Study design: repeated cross-sectional (country statistics)
Munne, 2005, Addiction	Argentina	Economic crisis of the late 1990s both affected economic factors (i.e., poverty and unemployment) and social factors (i.e., vulnerability, security, crime); Cultural stigma on alcohol	Budget constraints; Psychological distress (=thin)	Economic crisis (1990–2005) (*macro*)/ Statements about alcohol consumption in the surrounding of an individual (*micro*)	General population: 18–65 years	More than a quarter agrees that there are persons in their surrounding whom drink alcohol to escape (mostly agreed by individuals with low educational levels and women), stop going to bars (mostly agreed by individuals with low educational levels and men), buy cheaper alcoholic beverages (mostly agreed by men) and that it is important to cut down on alcohol expenses (mostly agreed by individuals with low educational levels and women); living in a surrounding with many persons with drinking problems results in agreement with all statements	Evidence: thick/ moderate Study design: cross-sectional (survey)
Nandi et al., 2013, Journal of Epidemiology and Community Health	United States	Post-2007 Great Recession	Budget constraints; Psychological distress (absent/ contradictory association)	Unemployment rate (*macro*)/Alcohol consumption; number of drinks during last month; and heavy drinking; average daily intake of ≥2 (men) or ≥1 (women) drinks (*micro*)	General population: ≥25 years	Higher unemployment rate was related to less number of drinks and heavy drinking in both employed and unemployed persons (mainly among men and those long-term unemployed (≥1 year))	Evidence: thick/ moderate Study design: repeated cross-sectional (survey)

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Table 1 (*continued*)

Author(s), year, journal	Country	Context of country	Mechanism	Determinant/outcome	Study population	Results	Degree of coverage[a]
Perlman, 2010, BMC Public Health	Russia	Financial crisis (late 1990s)	Budget constraints	Financial crisis (1998) (*macro*)/Frequent heavy drinking; ≥ 80 g of spirits (vodka or samogon) on one occasion, ≥ 1 a week; and drinking samogon; cheap low quality drink (*micro*)	General population: ≥ 18 years	Financial crisis led to a reduction in frequent heavy drinking (in all men (strongest in those who lost their job and persons aged 18–39) and only in urban women, women with tertiary educational levels and women aged 40–59) and an increase in samogon consumption (both sexes but largest absolute effect in men; aged 60 or above, pessimistic about familial finances, with secondary –educational levels or less, very heavy drinkers, or rural residents); Strong correlation between household income and frequent heavy drinking (only in men and strongest in those with low-educational levels)	Evidence: thick/ broad Study design: longitudinal (survey)
Richman et al., 2012, Journal of Addictive Diseases	United States	Post-2007 Great Recession	Psychological distress; Social situation (=moderate)	Economy-related stressors; income-related subscales, unemployment, social role constraints, inadequate health insurance (*micro*)/ Alcohol consumption; number of drinks per day during last month; and problem drinking (*micro*)	General population: ≥18 years	Higher economy-related stressors are related to higher alcohol consumption and problem drinking (strongest in men)	Evidence: thick/ broad Study design: cross-sectional (survey)
Shim and Cho, 2013, International Journal of Public Health	Korea	Economic crisis (1995–2005); Sudden rise in unemployment (middle-aged and those with low educational levels) and economic polarization	Social situation (=thin); Responsibility	Economic crisis (macro)/Alcohol-caused deaths (micro)	General population: 40–59 years	During the crisis health inequalities increased; more alcohol-caused deaths among individuals with low educational levels and those unemployed	Evidence: thick/ small Study design: repeated cross-sectional (registry)
Stuckler et al., 2009b, Lancet	Europe	Economic downturn is only based on unemployment rate	Psychological distress	Mass job loss (>3% in one year) (macro)/ Alcohol-related mortality (macro)	General European population	Mass job loss coincides with an increase in mortality caused by alcohol abuse. A social safety net is very important to prevent increases in psychological distress (defined as suicide)	Evidence: thick/ small Study design: repeated cross-sectional (country statistics)
Tangcharoensathien et al., 2000, Social Science and Medicine	Thailand	Economic crisis (late 1990s), which is characterized by increased income inequality	Budget constraints	Economic crisis (1997) (*macro*)/Expenditure on alcohol (*micro*)	General population	Economic crisis led to less money spent on alcohol (across all income deciles)	Evidence: thick/ broad Study design: repeated cross-sectional (survey)
Taylor et al., 2010, Population Health Metrics	Australia	Global financial crisis (2007)	Social situation	Tough times (including global financial crisis) (*macro*)/Used coping strategies (*micro*)	New South Wales population: ≥16 years	Coping strategies are drinking (strongest in men and those psychologically distressed), use of friends/neighbours (strongest in women, weakest in non-English speaking), positive emotional/philosophical (weakest in non-English speaking and strongest in those on low income) and religious/spiritual beliefs (strongest in women and those with low income)	Evidence: thin/ moderate Study design: cross-sectional (survey)

Table 1 (*continued*)

Author(s), year, journal	Country	Context of country	Mechanism	Determinant/outcome	Study population	Results	Degree of coverage[a]
Treisman, 2010, Economics of Transition	Russia	Social and economic transition (early 1990s)	Psychological distress (=small)/ Budget constraints	Lower vodka prices during transition (*macro*)/Alcohol-related mortality (*micro*) and alcohol sales (*macro*)	General population	The transition was accompanied with lower vodka prices and this led to more sales and higher alcohol-related mortality	Evidence: thick/ moderate Study design: repeated cross-sectional (country statistics and survey)
Valkonen et al., 2000, European Journal of Public Health	Finland	Economic recession (early 1990s); Large scale unemployment	Budget constraints	Economic recession (1991–1995) (macro)/ Alcohol-related mortality (micro)	General population: 35–64 years	Economic recession led to a less strong increase (changed trend) in alcohol-related mortality	Evidence: thick/ small Study design: repeated cross-sectional (registry)
Vijayasiri et al., 2012, Addictive Behaviors	United States	Post-2007 Great Recession	Psychological distress	Economic stressors (*micro*)/Alcohol consumption; frequency of drinking; and problem drinking (*micro*)	General population: ≥ 18 years	Economic stressors (i.e., inadequate health insurance, unemployment, undesirable work situation, home ownership problems) relate to somatic symptomatology and these symptoms were associated with a higher frequency of drinking, binge drinking, drinking to intoxication and problem drinking (in men but not in women)	Evidence: thick/ broad Study design: cross-sectional (survey)
Wojtyniak et al., 2005, Addiction	Poland	Economic and social transition (>1990); Reduction in prices and higher availability of alcoholic beverages	Psychological distress	Economic transition (>1990) (macro)/ Mortality caused by diseases of the liver and alcohol poisoning (micro)	General population: ≥ 18 years	Economic transition led to higher mortality caused by diseases of the liver (only in men aged under 65 years) and alcohol poisoning (in both men and women)	Evidence: thin/ small Study design: repeated cross-sectional (registry)
Zemore et al., 2013, Journal of Studies on Alcohol and Drugs	United States	Post-2007 Great Recession; Blacks are more exposed to job loss (strongest in those aged 18–24) and have less access to healthcare and to information crucial for accessing employment and financial support	Psychological distress (=thin/ moderate); Budget constraints (absent/ contradictory association); Responsibility (=small)	Economic losses; job loss, lost housing (*micro*)/Alcohol consumption; daily number of drinks; monthly drunkenness, negative drinking consequences, and alcohol dependence (*micro*)	General population: >18 years	Job loss and lost housing during the Great Recession were related to negative drinking consequences (stronger in Blacks than Whites, absent in Hispanics), and alcohol dependence (stronger in Blacks than Whites, absent in Hispanics)	Evidence: thick/ broad Study design: cross-sectional (survey)

The studies shaded in gray were not included in our results section.

[a] Thick or thin description of mechanism and degree of coverage of empirical evidence; small: supporting none of the mechanism; moderate: supporting part of the mechanism; broad: supporting the complete mechanism.

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