

# How Do Register-Based Studies Contribute to Our Understanding of Alcohol's Harms to Family Members? A Scoping Review of Relevant Literature

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**ABSTRACT. Objective:** This review maps the research literature on register-based studies of alcohol's harms to family members and identifies areas for future research. **Method:** Using a scoping review methodology, the PubMed/MEDLINE, EMBASE, and PsycINFO databases were searched in August 2019 with keywords to identify studies that included register-based outcome sources, a family relationship, and an exposure to heavy drinking. In total, 5,961 records were screened, 403 full-text articles were assessed for eligibility, and 91 studies were included in the final review. **Results:** Register-based research on alcohol's harms to family members has largely drawn on hospital records to identify heavy drinkers and has primarily focused on children of heavy drinkers; 79 of the included studies solely investigated harms to children, whereas 2 focused on partners and 10 on multiple first-degree or unspecified relatives. Register-based studies show that children of heavy

drinkers are at a higher risk for mental disorders, disease and injury hospitalizations, infant and child mortality, criminality, poor employment and educational outcomes, abuse/neglect, and placement in residential/foster care, among other negative outcomes. **Conclusions:** A substantial body of register-based research shows that children of parents with the most severe alcohol problems are at an increased risk for numerous adverse experiences. Register-based studies have investigated diverse, yet precisely defined outcomes, using large samples followed over long periods, and have examined the contribution of genetic, biological, and environmental factors. Our understanding of alcohol's harms to families could be enhanced by further register-based research on other household family members of heavy drinkers. (*J. Stud. Alcohol Drugs*, 82, 445–456, 2021)

**I**N WHAT WAYS does alcohol cause harm to others than those who drink themselves? Within the last 10 years, there has been an expansion of research on consequences that extend beyond the drinker, with alcohol's harm to others regarded as an umbrella term for a range of long- and short-term effects, of varying degrees of severity, inflicted by both known persons and strangers, and at both the individual and societal levels (Laslett et al., 2019). Although some studies show that harm because of strangers' drinking may be more prevalent (Laslett et al., 2011), harms caused by close relations, such as household family members and friends, may be more severe (Laslett et al., 2011) and distressing (Karriker-Jaffe et al., 2017).

Survey data have been an important source of information about the magnitude of alcohol's harms to others (Rossow, 2015) and can measure outcomes not easily assessed by other means, such as fear of harm (e.g., feeling unsafe because of others' drinking). However, surveys often rely on self-reports of alcohol-related harms, which may be influenced by individual, cultural, or temporal factors (Room et al., 2016; Rossow, 2015). It could be problematic, then, if

our understanding of alcohol's harms to others were based solely on surveys that ask participants to judge whether an undesirable event for oneself or others was attributable to alcohol. There is a need for some reflection on approaches to measure alcohol's harms to others and the sources of data used to describe and quantify these harms.

Some of the limitations of population surveys could be addressed by complementing such research with register-based data (Lund & Bukten, 2015; Rossow, 2015). Until now, however, the contribution of register-based studies has not been adequately reviewed. Register-based studies analyze existing population registers consisting of individual-level data, which have been systematically collected and regularly updated on a complete target population (United Nations Economic Commission for Europe, 2007). Like surveys, register-based research has the advantage of large study populations, and registers' wide population coverage minimizes biases attributable to selection and attrition (Thygesen & Ersbøll, 2014). Furthermore, these data are often available over extended periods, thereby allowing assessment of long-term consequences. Thus, registers are apt for capturing a range of potential harms, including rare but severe outcomes in such areas as mental health and violence (Rossow, 2015).

Register-based studies can establish associations between alcohol and harm in numerous ways. This link may be made directly, such as when alcohol's role in an event is recorded in the same register entry as the assessed outcome. For in-

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stance, registers of child abuse or protection measures may also record parental heavy drinking. The link may also be made through statistical analyses showing an increased risk of harm (Rossow, 2015). Since register studies can identify relatives and link records via a personal identification number, they are a fruitful source of information for alcohol's harms to family members. Previous reviews have investigated outcomes for the family as a whole (Hutchinson et al., 2014) and for children specifically (Rossow et al., 2016; Staton-Tindall et al., 2013), but we are unaware of reviews that have explored the contribution of register-based research.

The aim of this current review is to map the literature on register-based studies of alcohol's harms to family members. Accordingly, the review addresses the following research questions:

1. Which family members, in terms of relationship to the drinker, are the focus of the studies?
2. How has the exposure been operationalized?
3. What harms/outcomes for family members of heavy drinkers have been investigated?
4. What are the main findings of register-based studies, and how do the findings differ from those of survey-based studies, if at all?
5. What are the gaps in existing register-based research on alcohol's harms to family members?

## Method

### *Study design*

We used the scoping review methodology, which, although similar to that of a systematic review, is guided by the unique objective of charting the available literature on a research topic (Pham et al., 2014). The process of identifying and presenting the literature is distinguished by broader coverage and handling of the subject (Pham et al., 2014). Scoping reviews have as their main objectives to broadly describe all available research on a broad topic and identify understudied aspects (Arksey & O'Malley, 2005). This contrasts with systematic reviews, which are more narrowly focused and often aim to summarize results of comparable studies on a highly specific topic (Munn et al., 2018). The scoping review methodology was appropriate for the current review, as it is best suited to providing an overview of the literature and identifying areas where research is lacking. This review was carried out in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist (Tricco et al., 2018).

### *Information sources and search strategy*

The review of records was carried out in August 2019, in which studies were identified by searching three elec-

tronic research literature databases (PubMed/MEDLINE, EMBASE, and PsycINFO), using subject headings and terms related to relationship to the drinker, exposure, and data source (Supplemental Box 1). A final source was the reference lists of all included records. Scoping reviews may include nontraditional information sources, also known as grey literature (Tricco et al., 2018). This review, however, included only peer-reviewed studies; this served to maintain consistency with other reviews on this topic and operated as a rough quality check of included studies.

### *Eligibility criteria*

The following criteria were used:

1. Studies must have investigated alcohol use as an exposure. No constraints were placed on the exposure data source. Studies that combined alcohol and illicit drug use into a category of "substance use" were included. There were several reasons for this decision. First, alcohol is more prevalent than any illicit drug and associated with a larger burden of illness globally (Peacock et al., 2018). This means that when a nonspecific substance use disorder is coded in a register, it is more likely to be an alcohol use disorder than any other substance. Second, people with severe alcohol problems may often have concurrent use of illicit drugs, making the distinction difficult to make, even if an attempt has been made in the original study (Staines et al., 2001).
2. The outcome variable must have been focused on harm to a family member of the drinker. Any familial relationship, immediate or extended, was accepted; however, the search terms reflect that household relations are prioritized given their intense and prolonged exposure.
3. The outcome must have been reported using a centralized register as the data source.
4. Only individual studies were included.
5. Studies published in English were included, with no restrictions on date of publication.
6. Studies that only assessed prenatal exposure or perinatal outcomes were excluded, as were studies with only substance-related outcomes.

The database searches identified 5,134 records, and a review of the included records' reference lists identified an additional 2,737 records. Duplicates from the database searches and reference lists were removed using EndNote X8.2, leaving a total of 5,961 unique records. The titles and abstracts of all unique records were screened by the first author, and based on this initial review, 403 of the records were selected for a review of the full text. Of these, 91 studies were assessed as meeting the inclusion criteria for the scoping review. Figure 1 presents the PRISMA flowchart of the selection process.

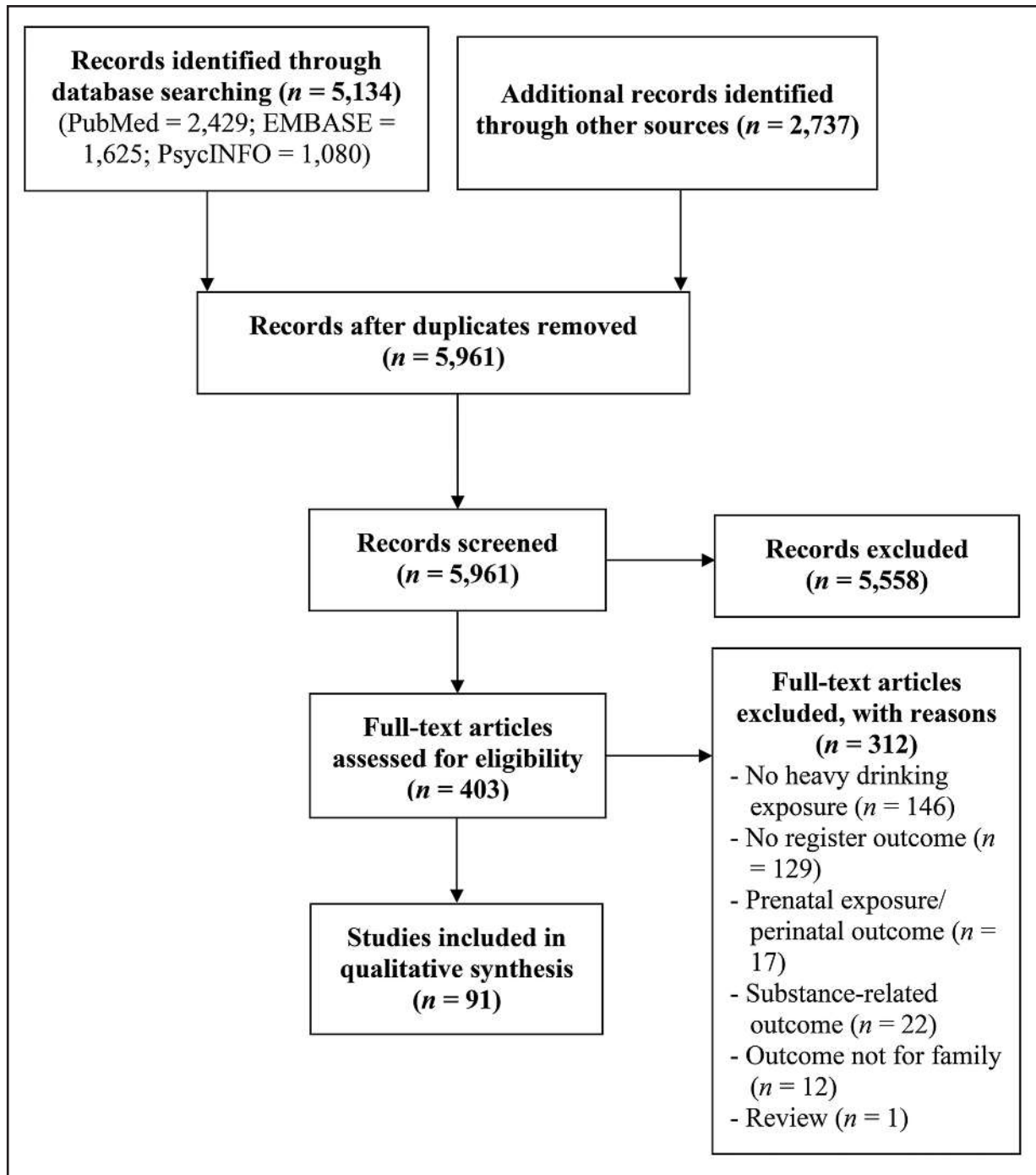


FIGURE 1. Flow diagram of records screened, assessed, and included in the review. *Note:* Some articles were excluded for multiple reasons.

#### Data charting and extraction

The following descriptive characteristics were extracted from each record: author(s), publication year, title, study focus, study population, length of follow-up, exposure measure (including data source and definition of heavy drinking), relationship between the drinker and family member, outcome

measures (including data source and definition), and main findings. “Exposure” refers to exposure to a heavy-drinking family member. We applied a broad definition of “heavy drinking” because we wanted to include a range of ways in which problematic use of alcohol was operationalized. The extracted data were grouped into overarching categories, and the number of studies that fell into each category was totaled

and reported in tables. Some studies used multiple sources to define heavy drinking and/or included multiple outcome measures.

A vote-counting procedure, also known as a box-score method, was used to summarize the main findings of the subset of studies in which substance use of a family member was the primary explanatory variable. This procedure, chosen because of the heterogeneity of the studies, involved totaling the number of studies with significant positive, significant negative, and nonsignificant findings (Light & Smith, 1971). Substance use was defined as heavy drinking, solely, or in combination with problematic illicit substance use. In reporting our findings, we have used the terms “heavy drinking” and “substance use” broadly to cover the various ways in which the exposures were defined, although these were not necessarily the terms used by the authors of the studies.

## Results

### *Study characteristics*

The 91 studies were conducted in seven countries, with the vast majority ( $n = 78$ ) carried out in the Nordic region. Studies were published between 1976 and 2019. Nearly two thirds were published since 2010 ( $n = 60$ ), and, of these, 44 were published since 2015. Approximately 87% of the studies ( $n = 79$ ) had a sole focus on outcomes of children of heavy drinkers. Spouses/partners were the sole focus of two studies. More than one first-degree relative (i.e., children, siblings, parents) was the focus of seven studies, and unspecified family members were the focus of three studies. In 23 of the 91 studies, familial substance use was the primary explanatory variable under investigation, as opposed to one of several risk factors (Supplemental Table A). Heavy drinking was considered a unique exposure in 49 studies, and the remaining 42 studies combined heavy drinking and illicit drug use into a single exposure category (Supplemental Table B).

### *Exposure measures*

There was considerable heterogeneity in the sources used to assess heavy drinking. The majority of studies, however, used at least one register-based measure. Hospital registers as the sole information source were used by 41 studies. These studies defined a heavy drinker as an individual with a hospital admission for an alcohol-related diagnosis, including, for example, alcohol abuse, alcohol dependence, accidental alcohol poisoning, and/or alcoholic cirrhosis of the liver. Informant reports as the sole information source were used by 13 studies; for example, respondents were asked to report whether a family member was a heavy drinker. The various combinations of information sources are presented in Supplemental Table C.

### *Outcome measures*

The register-based outcomes for family members of heavy drinkers covered a range of areas (Supplemental Table D). Mental health outcomes were the most common, followed by mortality (including suicide) and criminal activity. Studies operationalized mental health outcomes as a diagnosis of a mental disorder recorded in an inpatient or outpatient care register or as a purchase of medication intended for the treatment of mental disorders as recorded in a register of prescription medicines. Mortality was defined based on a recorded death in a cause-of-death register. Criminal activity was operationalized as a conviction recorded in a criminal offenses register. Some studies distinguished between categories of crime, such as violent crimes, and others investigated recidivism.

Employment/financial outcomes, physical health conditions, and out-of-home placements were less common, but still comprised approximately 10% of the studies. Employment/financial outcomes consisted of registrations related to periods of unemployment, receipt of social benefits, and disability pensions recorded in registers of labor market participation and social insurance. Outcomes related to physical health were defined as a hospitalization for an injury or disease, based on the International Classification of Diseases (ICD) diagnosis codes and recorded in a patient register, a registration in a clinical disease register, or by sick leave registrations in a national health insurance register. Other outcomes are summarized and described in Supplemental Tables B and D.

### *Main findings: Studies with substance use as primary explanatory variable*

This section summarizes findings in selected outcome areas of the subgroup of 23 studies in which familial substance use was the primary explanatory variable (Table 1) (results and additional outcomes available in Supplemental Table E).

*Mental disorders.* Of the five studies that assessed risk of nonspecific mental disorders, four studies found that parental substance use was associated with some measure of increased risk (Jääskeläinen et al., 2016; Martikainen et al., 2018; Raitasalo & Holmila, 2017; Raitasalo et al., 2019); however, in two of these studies, the results were mixed. Jääskeläinen et al. (2016) found that parental substance use increased the odds of adolescent mental disorders, but not mental disorders in mid-childhood. Raitasalo et al. (2019) found that both less severe and severe heavy drinking in mothers increased the risk of mental and behavioral disorders in their children compared with children of non-heavy-drinking mothers; but, for fathers, there was only an increased risk for severe heavy drinking. Findings for specific mental disorders are presented in Table 1 and Supple-

TABLE 1. Summary of main findings of 23 studies with substance use as main exposure, grouped by outcome area

Area of harm	Number of studies included (alcohol only/ alcohol + other substances)	Countries	Analysis type (Bivariate Multivariate)	Main findings
Nonspecific psychological illness	5 (2/3)	Denmark (1) Finland (4)	Multivariate	Four of five studies found some significant association between parental substance use and offspring psychiatric morbidity (Jääskeläinen et al., 2016; Martikainen et al., 2018; Raitasalo & Holmila, 2017; Raitasalo et al., 2019).
Mood disorders	1 (1/0)	Finland	Multivariate	Maternal severe heavy drinking increased children's risk of mood disorders; no significant increased risk for paternal heavy drinking (Raitasalo et al., 2019).
Neurotic disorders	1 (1/0)	Finland	Multivariate	Maternal severe heavy drinking increased children's risk of neurotic, stress-related, and somatoform disorders; no significant increased risk for paternal heavy drinking (Raitasalo et al., 2019).
Disorders of psychological development	2 (2/0)	Finland Sweden	Multivariate	Mixed results, with one study showing no significant increased risk for disorders of psychological development among children of heavy drinkers (Raitasalo et al., 2019) and one showing significant increased risk of autism (Sundquist et al., 2014).
Behavioral and emotional disorders	3 (3/0)	Finland (1) Sweden (2)	Multivariate	All studies showed some increased risk of behavioral and emotional disorders, such as attention deficit/hyperactivity disorder, for children of parents with heavy drinking (Long et al., 2018; Raitasalo et al., 2019; Sundquist et al., 2014).
Infant and child mortality	2 (2/0)	Australia United States	Multivariate	Maternal heavy drinking increased risk for sudden infant death syndrome and other causes of infant mortality (O'Leary et al., 2013) and child death (McCutcheon et al., 2019).
Adult and young adult mortality	4 (4/0)	Denmark (2) Sweden (1) United States (1)	Multivariate	Mixed findings depending on cause of death.
Criminality	6 (6/0)	Denmark (1) Australia (1) Sweden (4)	Multivariate (3) Bivariate (3)	Five studies found significant differences in recorded convictions between children exposed to parental heavy drinking and controls (Christoffersen & Soothill, 2003; Hafekost et al., 2017c; Long et al., 2018; Müitzell, 1994; Rydelius, 1981).
Employment	4 (4/0)	Denmark (1) Sweden (3)	Multivariate (1) Bivariate (3)	Parental heavy drinking associated with increased risk of youth unemployment (Christoffersen & Soothill, 2003).
Abuse/neglect	2 (2/0)	Denmark Australia	Multivariate	Parental heavy drinking associated with increased risk of child being a victim of violence (Christoffersen & Soothill, 2003) and of maltreatment (Hafekost et al., 2017).
Placement in residential or foster care	6 (6/0)	Denmark (1) Australia (1) Finland (1) Sweden (3)	Multivariate (3) Bivariate (3)	Parental heavy drinking associated with increased risk of child's placement in residential or foster care (Christoffersen & Soothill, 2003; Hafekost et al., 2017a; Müitzell, 1994; Müitzell, 1995; Raitasalo et al., 2015; Rydelius, 1981).
Education	3 (3/0)	Sweden (1) Australia (2)	Multivariate	Parental heavy drinking associated with poorer school performance and attendance among offspring (Berg et al., 2016; Hafekost et al., 2017b; Johnson et al., 2017)
Disease and injury hospitalizations	4 (3/1)	Finland (3) Australia (1)	Multivariate	Increased risk of hospital admission among the children of substance-using parents (O'Leary & Slack-Smith, 2013; Raitasalo & Holmila, 2017; Raitasalo et al., 2015; Winqvist et al., 2007)
Teenage pregnancy	1 (1/0)	Denmark	Multivariate	Parental heavy drinking associated with increased risk of teenage motherhood (Christoffersen & Soothill, 2003).
Child welfare	3 (3/0)	Sweden	Bivariate	Significant differences between offspring of heavy drinking parents and controls in terms of registrations for child welfare (Müitzell, 1994, 1995; Rydelius, 1981).
Suicide attempts	1 (1/0)	Denmark	Multivariate	Parental heavy drinking not associated with increased risk of suicide attempts (Christoffersen & Soothill, 2003).



mental Table E; these results generally show a similar trend to nonspecific mental disorders.

**Mortality.** Two studies that investigated infant and child mortality found that maternal heavy drinking was associated with an increased risk of offspring death (McCutcheon et al., 2019; O'Leary et al., 2013). Among the four studies that examined young adult or adult mortality, two found a higher risk of death during the follow-up period among family members of heavy drinkers (Christoffersen & Sothill, 2003; Rogers et al., 2016). One study found no significant association between father's alcohol consumption and risk of suicide or other types of violent mortality, and, for total mortality, found mixed results depending on paternal drinking frequency (Landberg et al., 2018).

Of note, Rogers et al. (2016) was the only study among the 23 studies with substance use as the primary explanatory variable that was not restricted to the parent-child relationship. By including various relationships (i.e., a parent, sibling, or other relative), this study assessed different forms of dose-response and showed elevated risk regarding number of heavy drinkers lived with, years lived with the heavy drinker, and relationship to the drinker, with parental heavy drinking exerting a larger influence than the heavy drinking of other relatives (Rogers et al., 2016).

**Criminality.** Regarding recorded convictions, five of the six studies that investigated criminality found some significant difference between children exposed to parental heavy drinking and those who were not (Christoffersen & Sothill, 2003; Hafekost et al., 2017c; Long et al., 2018; Müitzell, 1994; Rydelius, 1981). One of these studies found significant differences only among male offspring (Rydelius, 1981).

**Education.** Three studies investigated educational attainment and found poorer outcomes for children of heavy drinkers in terms of school performance or attendance (Berg et al., 2016; Hafekost et al., 2017b; Johnson et al., 2017). However, in one study (Berg et al., 2016), most of the effects were attributed to co-occurring family psychosocial circumstances.

**Abuse and/or neglect and placement in residential or foster care.** Both studies that looked at abuse/neglect found a significant association, with one showing that parental heavy drinking was associated with an increased risk of a child being a victim of violence (Christoffersen & Sothill, 2003) and the other showing a significantly increased risk of maltreatment (Hafekost et al., 2017a).

Six studies investigated risk of placement in residential or foster care, and all found significant differences between children of heavy drinking parents and controls (Christoffersen & Sothill, 2003; Hafekost et al., 2017a; Müitzell, 1994, 1995; Raitasalo et al., 2015; Rydelius, 1981). In two early studies, however, the difference was only significant among male offspring (Müitzell, 1995; Rydelius, 1981). Raitasalo et al. (2015) investigated risk of heavy drinking and illicit drug use as separate and combined exposures and found the high-

est risk among children of mothers with combined substance use.

**Disease and injury hospitalizations.** All four studies of physical illness and injury hospitalizations showed an increased risk among the children of substance-using parents (O'Leary & Slack-Smith, 2013; Raitasalo & Holmila, 2017; Raitasalo et al., 2015; Winqvist et al., 2007). Again, when looking at parental use of different substance categories independently and in combination, Raitasalo et al. (2015) found the highest risk for combined parental alcohol and illicit drug use.

## Discussion

This review shows that, overall, register-based research on alcohol-related harms to family members has focused mainly on children of heavy drinkers, with only a small proportion having examined other household relations. Much of this research has drawn upon hospital records to identify heavy drinkers, and most studies have investigated a range of risk factors rather than having heavy drinking as a primary focus.

The fact that nearly all research focused on children as victims of family members' heavy drinking is somewhat surprising, given that prior survey research indicates that having a spouse with an alcohol problem is associated with an increased risk for psychological disorders, mental distress, victimization, and injury (Dawson et al., 2007; Rognmo et al., 2013) and that alcohol is a risk factor for intimate partner violence (Abramsky et al., 2011). On the other hand, this result makes sense in that conducting survey research on children is challenging (Einarsdóttir, 2007), making register-based research an attractive alternative. Because register-based studies use existing data and do not require active participation of the research subject, they may be particularly apt for exploring alcohol's harms to children.

Record linkage, in which a register-based measure of exposure is linked with another register-based outcome, was used overwhelmingly by the studies. This means that the alcohol problems of the drinker needed to be sufficiently large to produce, for example, a record of a hospitalization, death, or criminal offense due to an alcohol-related cause. This approach captures mainly the more extreme end of the spectrum of harmful and hazardous alcohol use (Babor et al., 2001; Saha et al., 2006), and thus studies that rely solely on register-based definitions of exposure will capture a fraction of the total cases (Miettunen et al., 2011). Furthermore, alcohol-related disorders are particularly stigmatized conditions (Schomerus et al., 2011) and therefore may be underreported in administrative data, for example, as a cause of death (Cipriani et al., 2001; Rehm et al., 2017).

General population surveys investigating alcohol's harms to children have captured some of the same domains covered by studies included in this review, such as physical health and abuse/neglect. These areas have been probed using

survey questions, such as, “In the last 12 months, has one or more of the children who you are responsible for . . . been left in an unsupervised or unsafe situation/been yelled at, criticized or otherwise verbally abused/been physically hurt/witnessed serious violence in the home . . . because of someone’s drinking?” (Laslett et al., 2019). In addition to assuming attribution of a causal link between heavy drinking and harm inherent in such survey items, the questions require some level of interpretation of the outcome on the part of the adult respondent. Surveys investigating alcohol’s harms to family members also include sensitive questions and therefore may risk underreporting by participants (Tourangeau & Yan, 2007). On the other hand, register-based studies have addressed these domains by targeting highly specific and precisely defined harms. For instance, hospitalizations because of injuries, illness, or psychiatric disorder diagnoses are recorded in healthcare registers (Raitasalo & Holmila, 2017), and the association with heavy drinking is made by linking registers.

The findings from the current review are generally consistent with previous reviews of largely non-register-based studies, which demonstrate increased psychosocial problems among children exposed to parental substance use (Harter, 2000; Kuppens et al., 2020; Rossow et al., 2016). However, the present focus on register-based studies offers a unique contribution. As demonstrated in this review, register-based studies can inform on specific harms, such as precise diagnostic categories in the areas of physical and mental health (O’Leary & Slack-Smith, 2013; Raitasalo et al., 2015, 2019). The large sample sizes in most register-based studies also ensure adequate power to detect a hypothesized effect, which may be lacking when using other study designs (Harter, 2000).

The use of registers allows for tracking children from birth through adolescence and beyond. Studies included in previous reviews tended to focus on the adolescent period, or, when young children were included, they had a narrow emphasis on externalizing and internalizing problems (Kuppens et al., 2020; Rossow et al., 2016). In contrast, studies included in the current review cover a range of physical and mental health outcomes also among very young children (e.g., O’Leary & Slack-Smith, 2013; Raitasalo & Holmila, 2017). The use of register data also allows for testing theory-based hypotheses regarding the contribution of biological factors, for example, by looking at effects of timing of alcohol use disorder diagnoses in relation to pregnancy, or by separating socialization from genetic mechanisms by examining “lived with” versus “not lived with” immediate family members (Hafekost et al. 2017b; Long et al., 2018; O’Leary et al., 2013; Raitasalo & Holmila, 2017).

Although the causal pathways connecting alcohol and adverse outcomes for family members will likely include both genetic and environmental mechanisms, the relative strengths of influence of such mechanisms may differ de-

pending on the outcome. Therefore, using register data to separate the effects of living with heavy drinkers from those of being genetically related to them represents an important contribution (Kendler et al., 2015b; Khemiri et al., 2020).

### *Limitations*

To provide an overview of existing register-based research, this scoping review has covered a heterogeneous group of studies with varying population sizes, follow-up periods, definitions of exposures and outcomes, and covariates. However, this heterogeneity limited us to using a vote-counting procedure, which is not ideal for summarizing findings across studies (Higgins et al., 2019). Furthermore, as this review aimed to cast a wide net to identify all register-based studies of alcohol’s harms to family members, studies were included that did not distinguish between heavy drinking and illicit drug use.

Other than a recent meta-analysis of longitudinal studies investigating the association between parental substance use and various domains of child well-being (Kuppens et al., 2020), we are unaware of a substantial body of research comparing effects of alcohol and drug use on family members. Differences in the legal status of the substances could have an influence on the harms to family members; for instance, Kuppens et al. (2020) found a stronger association for illicit drug use compared with heavy drinking. Thus, there could be some concern about our ability to draw conclusions about heavy drinking as a unique exposure. However, 87% of the studies for which specific findings were presented included heavy drinking as a single exposure. Moreover, heavy drinking was an independent study exposure in 14 of the 16 areas of harm described in Table 1.

Since our search strategy prioritized household family members, some studies investigating harms to extended family members may have been missed. Such studies could have permitted a dose-response analysis—an examination of whether there is a gradation of the effect, such that family members more immediately connected to the drinker experience a greater degree of harm (Rogers et al., 2016).

### *Conclusions and future research*

Survey- and register-based methodologies can be seen as complementary. Whereas surveys can cover less severe, less tangible, and perhaps shorter term outcomes, register-based methods address more serious, persistent, and rare outcomes. Consideration of findings from these diverse methodologies represents an opportunity for a triangulation of data, wherein multiple data sources are used to verify and complement findings or point to inconsistencies in existing research.

This review demonstrates that a large body of register-based research has been produced on the topic of alcohol’s harms to children of parents with the most severe alcohol

problems. Findings demonstrate increased risk in areas such as hospitalizations for illness and injuries (Raitasalo et al., 2015), mental health diagnoses (Long et al., 2018; Raitasalo et al., 2019; Sundquist et al., 2014), convictions (Christoffersen & Sothill, 2003; Hafekost et al., 2017c; Long et al., 2018), and poor school performance and attendance (Berg et al., 2016; Hafekost et al., 2017b; Johnson et al., 2017).

Future research could assess the impact of alcohol use on household relations other than children of heavy drinkers. Whereas it may be burdensome to assess the experiences of both drinkers and family members using survey methods, population registers allow for the linking of parents, children, partners, and siblings, providing relatively easy access to existing data on relatives. In this way, researchers may explore the extent to which alcohol's harms to others has permeated family life.

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