RESEARCH PROJECT FINANCED BY NORWEGIAN RESEARCH COUNCIL: "ALCOHOL CONSUMPTION IN NORWAY: A MIXED-METHODS APPROACH."

1. RELEVANCE TO THE CALL FOR PROPOSALS

The project will "increase knowledge of alcohol consumption, drinking patterns and alcohol problems" (Norwegian Research Council's Work Plan on Alcohol and Drug Research, p. 8). We will conduct studies on four aspects of alcohol use: (i) longitudinal predictors and consequences of drinking patterns; (ii) secular trends in alcohol use; (iii) drinking cultures; and (iv) the relationship between licensed premises and prevalence of violence. We will employ a variety of theoretical approaches and use different types of data.

2. ASPECTS OF THE RESEARCH PROJECT

The overall aim of the study is to increase knowledge about alcohol use in Norway. We will investigate drinking patterns, and binge drinking in particular: the predictors, stability, consequences and secular trends of such patterns, as well as young adult drinking cultures. In a sub-study, we will investigate whether locations and characteristics of pubs and bars are related to the prevalence of violence in downtown Oslo. We will use existing unique datasets, such as longitudinal cohorts with self-reported information combined with registers, repeated large-scale cross-sectional datasets, a large database with qualitative interviews and finally so-called *geodata*, whereby we combine data with exact locations of bars and pubs with data on exact locations of reported crimes. Below we describe the four sub-themes in more detail.

2.1.1 Binge drinking: pathways, vulnerable sub-segments and consequences

Norway is one of the Nordic countries that, like the U.K. and Ireland, is usually characterized as having binge drinking problems among adults (1) and adolescents (2). Binge drinking is a major health concern (3), because it contributes to alcohol-related deaths (4), is associated with injuries, suicide, violence, traffic accidents (5) and social exclusion (6). Several longitudinal studies have investigated the aetiology of binge drinking (7), but the bulk of the research stems from highly selective U.S. college samples (8, 9). However, a recent longitudinal study of the general Norwegian population based on a dataset that will be used in the present study suggested a surprisingly specific pattern of role modelling, in that drinking patterns of parents were specific predictors of those of their offspring when they were approaching 30; this association may result from genetic or social influences (10).

Few studies have investigated the long-term consequences of adolescent and young adult binge drinking patterns, although there is some evidence that excessive alcohol consumption predicts violence (11) and sickness absence (12). On the other hand, there is evidence of low continuity in drinking behaviours in general population samples, which may be an argument against the existence of such associations (13). Other studies suggest high comorbidity between pathological alcohol use and a variety of mental health problems (14, 15), typically organized around "internalizing" and "externalizing" symptoms (16). However, to our knowledge, population-based longitudinal studies that investigate long-term trajectories of problematic alcohol use taking such dimensions into account are still lacking.

Aims

1. We will investigate childhood and adolescent predictors of young adult alcohol consumption, binge drinking patterns and alcohol problems.
2. Special emphasis will be placed on identifying trajectories in groups with varying levels of "internalizing" and "externalizing" mental health symptoms.
3. We will investigate possible long-term consequences of patterns of alcohol use and alcohol problems, with regard to employment, social welfare and criminal involvement. There is considerable evidence that the use of illegal substances generally may have worse long-term outcomes than the problematic use of alcohol. Thus, in these analyses, we will also investigate and control for the use of illegal substances such as cannabis, amphetamines and opiates.

Methods
The analyses will be based on the population-based *Young in Norway Longitudinal Study* (YiN) (see: 10, 17). The participants (N = 2,800) were followed from mid-adolescence until their late 20s by using questionnaires. The first data collection was in 1992, (response rate 97.0%). Participants were then followed up in 1994 (T2; 91.6% response rate), in 1999 (T3; response rate 83.4%) and 2005 (T4; response rate 82.4%). At T4, participants were asked to agree to linkage to several registers (90 % agreed). YiN was linked to Statistics Norway's Historical Event Database (Fd-trygd), with information on education, work, income and social welfare benefits. The dataset was also linked to official Norwegian Crime Statistics (18).

The YiN database contains measures of alcohol consumption and binge drinking, utilizing e.g. the Quantity/Frequency (QF) approach (19, 20), which gives a measure of the amount of pure alcohol consumed; we have measures of binge drinking, using a variety of cut-offs (5+ units, 10+ units), as well as on the subjective experience of drunkenness. RAPI (21) and AUDIT (22) measure alcohol problems. We have detailed information on socio-demography, parental factors, school adjustment, social support, externalizing/conduct problems (see: 23) and internalizing symptoms (symptoms of anxiety, depression, eating problems, suicidal ideation, feelings of loneliness, etc.) (see: 17), and use of tobacco and illegal drugs. The use of register data is a Nordic specialty; few other countries provide this opportunity (24). To our knowledge, no other international database on alcohol and substance use offers the combination of population-based longitudinal data collected directly from informants combined with the longitudinal follow-up in a variety of register data sources.

To obtain information about long-term consequences of alcohol consumption, analytic techniques specifically designed for longitudinal data will be used. More specifically, we will use autoregressive models and growth curve models in the framework of structural equation modelling (25). Due to their non-normal distribution, alcohol measures will either be treated as ordered categorical variables, or Poisson regression models will be used (26). Missing data will be handled by full information maximum likelihood estimation or multiple imputations (27). The large sample size combined with the high prevalence of alcohol consumption provides high statistical power for the statistical analyses. For instance, small correlations in the population (r=.11) between two variables will be detected with a power of .85.

2.1.2 Secular trends and the theory of "the collectivity of drinking cultures"
In the 1990s, there was an increase in alcohol consumption among young people in the U.K. (28), Denmark (29), Sweden (30) and Norway (31). In most countries, this increase among young people seems to have come to an end at the turn of the century, with subsequent decline in alcohol consumption (32, 33). However, poor response rates may bias recent estimates (34). Moreover, the total registered alcohol consumption in Norway across age groups *increased* by 50% from 1995 to 2010 (35). Thus, high-quality survey data is needed to

confirm possible divergent trends in various age cohorts. The first aim is to provide high quality information about time trends in alcohol consumptions among adolescents.

What happens when the level of consumption increases rapidly, as in the 1990s? Will heavy drinkers become more "ordinary" and less marginalized? What if the prevalence decreases, as it seems to have happened after the turn of the century? Will those who nevertheless start using alcohol report more psychosocial problems?

Such research questions have been examined closely with respect to tobacco use. Researchers have argued that those who continue to smoke tend to "harden", a process defined by increased levels of reported dependence (36). It has also been suggested that smokers are increasingly suffer from psychiatric and substance use comorbidity (37). A recent Norwegian study provided some support for this hypothesis (38). However, such "hardening" mechanisms have only been sparsely examined concerning alcohol consumption.

The second aim of this sub-study is to examine whether adolescents who started using alcohol in the early 1990s (when the rate of adolescent alcohol users was low) were characterized by more psychosocial risk factors than their counterparts at the end of the century (when the rate of adolescent alcohol users had increased). Moreover, we aim to investigate trends in marginalization after the turn of the century when consumption rates decreased. Are adolescent alcohol users now characterized by more conduct problems and depressive symptoms than their counterparts at the turn of the century?

The third aim of this sub-study is to shed more light on the influential "theory of the collectivity of drinking cultures" coined by Norwegian researcher Ole-Jørgen Skog (39). It suggests that changes in alcohol consumption typically occur across all segments of the population. Recent research has provided results that indicate consumption trends counter to Skog's theory. Firstly, one Swedish study found support for a polarization in alcohol consumption during recent years, with widening socio-economic differences between those consuming considerable amounts of alcohol and other people (40). However, another Swedish study reported reduced consumption in all consumer groups (41). Secondly, we witness diverging trends for different age groups, where young people's consumption is decreasing while consumptions among adults is increasing. A key to the puzzle may be that adolescents and adults do not typically drink in the same networks. Another mechanism may be related to the increasing immigrant population. Ethnic Norwegian youth may interact with and be influenced by Muslim youth to a larger degree than adults. A third mechanism may be related to youth cultures, where we witness increased use of internet-based games played at home, which appeal to adolescents also at risk for substance use.

Aims
1. We will investigate secular trends in alcohol consumption and binge drinking in adolescents between 1992 and 2010.
2. We ask: Are changing prevalence rates reflected in "softening" and "hardening" of the alcohol user groups in the same manner as seen among smokers?
3. We will shed more light on "the theory of the collectivity of drinking cultures" in investigating whether increases/decreases in consumption are reflected in all segments, as well as identifying factors that account for the likely reduction of alcohol use among adolescents, in a period when the consumption among adults has increased in Norway.

Methods
We will use three cross-sectional population-based datasets of 16–17-year-olds from 1992, 2002 and 2010, which have previously been described in detail (42). Questionnaire data were collected from 28 representative senior high schools in 1992. The same procedures were

3

utilized in the two later data collections, and response rates were 97%, (N=2,994), 91% (N=3,438) and 83% (N=2,813) for the three data sets. We have detailed information on factors such as alcohol use, parental background, school performance, leisure activities, conduct problems, smoking, use of cannabis, social integration and mental health, and these variables were measured with the same instruments at all time points (see also: 38).

Logistic and linear regression analyses will be conducted to provide information about time trends in alcohol use. In these analyses, time period will be dummy-coded by using the "repeated" contrast coding schedule, which is specifically used to obtain information about changes in mean level from one time point to the next (43). Research questions concerning hardening will be investigated by examining whether the relationship between risk factors and alcohol consumption is moderated by time of assessment (see, for instance 44). With sample sizes comparable to data used in the first sub-project, high statistical power is ensured.

2.1.3 Binge drinking: Ritual dimensions, norms, the importance of social contexts

While Norwegian alcohol researchers are at the forefront of epidemiological research, qualitative alcohol research is less developed. The third part of the project will shed light on the ritual dimensions, varying norms and importance of social contexts of alcohol use among young adults. Here, we use qualitative interviews and participant observation.

Over the past decade, the ritual and spatial aspects of drinking and partying have received some attention (for overviews see 45, 46). Most attention has been paid to urban "liminal spaces" in the night-time economy, where city centres are transformed by commercial actors into "nightlife hot spots" (47-49). Alcohol use among youth on "pub crawls" or "party cruises" (50) has also been described. Participants zone spaces to accommodate party practices, through drinking alcohol, playing music and dancing. In this way, normative structures may be altered (51-53). Such situations may also produce *effervescence*. This is best described as collective positive emotional experiences, a concept coined by sociologist Émile Durkheim (54). The structure of a party space can intensify such experiences, and may also contribute to the constitution of collective identities (55, 56).

We will investigate a number of drinking contexts, and try to identify the associated rituals and norm structures. The Norwegian high school graduation celebration, the so-called *russetid*, is one such context. Groups of students equip buses with powerful sound systems, disco lights, a bar and small spaces for dancing. Then they party while driving around, something which enable them to binge drink for up to 12 hours, almost daily, for three weeks. Initially this was a celebration for young members of the elite. Today, with the democratization of higher education, the majority of Norwegian cohorts participate (57). Another context we will investigate is the Introductory Week ("fadderuka") at universities. Preliminary findings suggest that there are large differences between the two experiences, with "fadderuka" being associated with much more control. The differences between the two experiences indicate not only the well-known fact that people behave differently when drinking than at other times, but also that different drinking occasions are coined and structured in very different ways. We will collect new qualitative data from e.g. working class contexts, and investigate whether a class dimension with regard to such norms is also revealed. Moreover, we will investigate in more detail sexual behaviours and alcohol consumption. The classical formulation of this research area was given by MacAndrew and Edgerton in their book *Drunken Comportment* (58), which is still considered the key text on the issue. They argue that the ordered "drunken changes-for-the-worse" differ greatly from society to society, and calls the phenomenon a "time out" from everyday norms. Sociologist Robin Room frames drunken comportment simply as "bad behaviour" (59). However, since even "negative consequences" of drinking often are evaluated as positive or neutral by a

significant proportion of drinkers (60), one could argue that drunken people often perceive what they are doing as *right*. That is, rather than being a "time out from norms", drinking and partying imply context-specific modifications of the moral order of everyday life (61).

Such an approach will connect the study of "drunken comportment" to fruitful new theories of morality (62). Thus, we suggest that drinking practices are fundamentally *social* practices, where the large context-specific variations in transgressions may be understood as modifications of the moral order; some are based on "hedonistic" values, while others are more concerned with "self-expression", or "integration".

Aims
1. We will explore different party contexts with regard to rituals, drinking, effervescence and perceived autonomy. In this way, we will shed light on more general processes related to young people negotiating their own party spaces.
2. We will try to identify how norms with regard to alcohol consumption and binge drinking may vary according to social class, gender, social context and situation.

Methods
We have already established a qualitative database with 120 semi-structured interviews sampled in various contexts: (i) interviews with participants on "hard partying scenes" in different areas of Norway, (ii) participants in the high school graduation celebration (*russ*) and (iii) participants at the Introductory Week at the University of Oslo. Interviews covered participants' lives from childhood to the present (63), as well as rich details of e.g. drinking behaviour, party practices, and sexual behaviour. Interviewers were trained sociologists and interviews lasted between 90 and 150 minutes. In addition, research assistants observed participants in both contexts. We have already recorded, transcribed, and done the first round of coding, using a qualitative data processing program. When coding, we have followed a style of coding consistent with general standards of qualitative research analysis (64, 65). We will collect approximately 50 new interviews, to broaden the class-based basis of the sample.

2.1.4 Spatial distribution of licensed alcohol premises, violence and crime in Oslo
The final sub-theme will also address the spatial aspects of alcohol use and possible consequences, but in this study, we will use geographically coded data. *Geodata* provide exact locations of places such as e.g. residences and restaurants, as well as reported crimes, according to longitude and latitude co-ordinates. The longitudinal geographical information systems (GIS) at Statistics Norway contain such data (66). These data sources have not previously been used much, and the few existing studies are descriptive in nature. We will use a more sophisticated approach, using multivariate regression techniques allowing estimates of covariates, enabling us to model temporal developments explicitly (67).

Theoretically, this sub-study may be situated within the domain of "neighbourhood effects". The key point is that characteristics of places affect or constrain individuals' actions. A seminal paper by Sampson et al. (68) coined the term "collective efficacy", which was defined as social cohesion among neighbours combined with willingness to intervene. Later studies have focused on neighbourhood ties and their interaction with socio-demographic factors (69). The empirical background for this sub-study is that certain areas of Oslo are much more exposed to violence and other types of crime than other areas. Furthermore, licensed premises (pubs, bars) seem to be concentrated in some of these areas.

Our analysis will include three approaches. First, we will study the spatial and temporal dynamics of crime, and in particular violent crime, in Oslo. Second, we will link these patterns to the density of bars and pubs, including data on opening hours. For this

purpose, we will use regression methods for spatial data. Thus, the level of violence and crime may be treated as a function of density of licensed premises, but also of day of the week and opening hours. However, such variations may also be a function of other characteristics of the relevant area, such as level of poverty or unemployment (70). Such indicators are available for all city districts, and the net effects of the concentration and localization of premises, after controlling for such indicators, will be modelled.

In this study, we will also use data from a natural experiment. In a project called SALUTT, based on the Swedish STAD project (71), the municipality of Oslo recently (2012–2013) trained employees at bars and pubs in the city centre. At the same time, the police has increased its control. We will investigate the possible effects of these interventions with regard to the longitudinal spatial concentration on violent crime in Oslo.

Aims
1. We will model the association between the spatial distribution of licensed alcohol premises and violent and other crimes. In particular, we will focus on the possible preventive effects of the suspension of licenses for certain pubs, due to violations of the rules.
2. We will study the possible effects of the SALUTT project.

Methods
Since 2000, the Norwegian police have reported offences using GIS in their registration system (BL/STRASAK/PAL). Thus, the reported offence is recorded with its exact location using co-ordinates. These data are not included in the ordinary crime statistics, but we have obtained access to such data from the police. Information on the location of licensed premises and suspension of licenses will be obtained from the municipality of Oslo, which will also provide us with more detailed data on the SALUTT intervention. Using GIS data, we can study the proximity of violent events as a function of proximity to licensed premises. When a new place opens or another place closes, we will get natural variation in each location's exposure to drinking behaviour, which can also be modelled as a function of other characteristics of the area. A range of techniques are developed for spatial analysis. The data can be treated directly as point data, aggregated up to a grid map or administrative borders (e.g. borough), or create other polynomials of particular interest such as specific areas targeted by the SALUTT project. We will use data organizations and methods as we see fit. For example, spatial lag models will be useful for grid-structured data, while generalized additive models can be useful for point data (72). These analytical methods are extensions of ordinary regression methods, and can be further extended into e.g. multilevel models with other characteristics of the area (73).

2.2 Plan, management, organization and co-operation
The applicant institution is the Department of Sociology and Human Geography at the University of Oslo. The project will be led by professor Willy Pedersen in the Department of Sociology and Human Geography, and professor Tilmann von Soest in the Department of Psychology, both at the University of Oslo, in co-operation with senior researcher Torbjørn Skardhamar at Statistics Norway. The applicants already collaborate on several research projects and have published together for several years. All three will lead the project described in 2.1.1, WP and TvS will lead 2.1.2, WP will lead 2.1.3 and all three will lead 2.1.4. Basically, all data for all sub-projects are already available, although linkages to registers must be regularly updated. WP and TvS have been key researchers in developing the YiN longitudinal database and the repeated cross-sectional survey database. All three have worked with YiN combined with registers; WP has established the qualitative database and

TS has worked to make GIS data available to the project. WP and TvS will invest their ordinary research time at the University of Oslo in the project (see the grant application form). TS will require some funding (see the grant application form). A PhD student or a post-doctoral candidate will be hired for sub-projects 2.1.1, 2.12, and 2.1.4 and will be located in the Department of Sociology and Human Geography. We will also include a number of international researchers in the group, such as professor David Fergusson (New Zealand) – who has developed a population-based longitudinal study quite similar to YiN; professor Robin Room (Australia) - who has worked with all kinds of data on alcohol use for almost four decades; professor Fiona Measham (UK) who has worked with British binge drinking cultures; and professor Margareta Järvinen (Denmark) – who in particular has worked with qualitative data, e.g. on substance use, social boundaries, identities and rituals. All have agreed to come to Oslo and will take part in concrete analyses and writing of articles.

2.3 Budget
Details about the budget are included in the grant application form.

3. KEY PERSPECTIVES AND COMPLIANCE WITH STRATEGIC DOCUMENTS
3.1 Compliance with strategic documents
In the Research Council's programme plan, alcohol is described as "the substance associated with the greatest harms" (p. 6); and the first of the priorities concern "alcohol and alcohol-related problems" (p. 9). The programme plan requires new research about "the Nordic drinking pattern" and asks whether "the theory of the collectivity of drinking cultures is still valid" (p. 6). Further, the programme plan argues that one should gather knowledge about alcohol and "integration and social relations" (p. 9). The importance of "qualitative studies" to highlight "sociocultural dimensions, rituals and symbols" is emphasized (p. 9). Finally, the plan requires "longitudinal studies" (p. 9) and, specifically, research into social scientific milieus at our universities (p. 6). Our proposed project reflects all of these priorities.

3.2 Relevance to society
These priorities also reflect official Norwegian policy on substance use, where alcohol is now regarded as the substance associated with the greatest problems (Meld St.30, 2011–12). The present study will shed new light on a variety of issues that are of utmost importance for the understanding of alcohol use and alcohol problems. We consider that the project will have large potential when it comes to the development of a future alcohol policy.

3.3 Environmental impact
No impact is expected.

3.4 Ethical perspectives
Ethical considerations are of special relevance because we conduct research involving vulnerable people. The potential ethical issues have been considered regarding research aims, methodology and possible impact. We have been in continuous contact with the Regional Ethics Committee for Health Research and the Norwegian Data Inspectorate. All participants have given their active, informed consent for participation in all studies, and all have permitted us to link survey and register data. We will not collect new data in this study.

3.5 Gender issues
Gender equality will be promoted. In sub-projects 1 and 2 a special emphasis will be put on gender-specific predictors and consequences of alcohol use. In sub-project 3 the importance

of masculinity and femininity in drinking cultures will be highlighted. In sub-project 4 our hypothesis is that the association between alcohol outlet density and violence will be strong for males, while the link to becoming victim of sexual assaults in particular will be of relevance for females In hiring new project personnel, UIO guidelines with regard to gender will be followed (https://www.uio.no/for-ansatte/ansettelsesforhold/likestilling/).

4. DISSEMINATION AND COMMUNICATION OF RESULTS
See grant application form.

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