AN INDEPENDENT REVIEW OF ISSUES RELATED TO ALCOHOL CONSUMPTION IN EUROPE

Prepared for

The Brewers of Europe

12 June 2006

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1. OVERVIEW

1.1. Background

The Brewers of Europe are concerned about the harms caused by inappropriate drinking of alcoholic beverages. Ahead of the Commission initiative to develop policy in the area of alcoholic beverages, The Brewers of Europe are seeking to insure that they have the best possible basis for their input into the EU policy making process. The Brewers of Europe recognise that the most effective harm reduction policy must be evidence-based (See Annex I).

In this context, The Brewers of Europe asked THE WEINBERG GROUP to assist the industry in gaining a better understanding of those areas for which there appear to be conflicting views or ambiguity in the scientific literature, namely:

- European Cultural Differences and Alcohol Consumption.
- Total Consumption of Alcohol and Drinking Patterns: Implications for Harm.
- Risks and Benefits of Alcohol Consumption: The Role of Moderate Drinking.
- Adverse Social Consequences of Alcohol Consumption; *and*
- Influences on Adolescence Drinking.

1.2. The Process

Recognising that in a field where there is an extensive body of literature, where the issues have been vigorously debated, and where strong commercial and ideological positions are involved, THE WEINBERG GROUP followed, as a precondition, an arm's-length approach to this assignment. The process involved the following steps:

- *The Literature Review*

  THE WEINBERG GROUP developed a detailed review of the literature using extensive references in the five areas under consideration. This review is located in Sections 4 through 8 of this report. The review sought to be a fair, accurate and up-to-date representation of the literature in the field. Scientific conclusions were drawn for each topic but no views related to policy implications were expressed. This review was examined and commented on by industry experts. Under the terms of the assignment, THE WEINBERG GROUP remained the ultimate arbiter of the content of the review and its conclusions.

- *Creating the Expert Panel*

  The next stage in the process was to empanel a group of experts with experience relevant to the areas under consideration, evidence-based policy-making and institutional governance. During the expert recruitment process, the participating experts were informed that while consensus opinions would be sought, dissenting views would be accommodated and recorded in the final report. Also, The

Brewers of Europe would have no editorial rights on the report of meeting. These undertakings formed part of the formal invitation to participate in the expert panel meeting.

The literature review was delivered to the panel members ahead of the panel meeting to allow ample time for their analysis. The panel was tasked with two requests:

- To opine as to whether the review was a fair, accurate and up-to-date representation of the state of the science; and
- To come to the meeting prepared to comment on the outcome of the review in terms of its potential implications for European policy development.

- *The Panel Meeting*

The panel met at the Brussels office of THE WEINBERG GROUP on May 9, 2006. The panel members were:

- **Prof. M. Harvey Brenner**
  Professor of Health Policy and Management, Johns Hopkins University, US
  Professor of Epidemiology, Berlin University of Technology, Germany
  Professor of Social and Behavioral Sciences, University of North Texas, Health Sciences Center, US

- **Prof. Marie Choquet**
  Research Director, National Institute of Health and Medical Research (INSERM), France

- **Mr. Bill Durodié**
  Senior Lecturer in Risk and Corporate Security, Cranfield University, United Kingdom

- **Prof. Jean-Marc Orgogozo**
  Head of the Neurology Division, University Hospital, Pellegrin
  Professor of Neurology, University of Bordeaux, France

- **Prof. Pedro Marques-Vidal**
  Auxiliary Professor and Head of the Nutritional Epidemiology Group, Medical Faculty, University of Lisbon, Portugal

- **Dr. Myron S. Weinberg (Moderator)**
  Associate Professor, Department of Psychiatry, Georgetown Medical School, US

Joseph Huggard and Carlos Peza of THE WEINBERG GROUP also attended the meeting to provide logistical support and minute taking. Industry did not attend the meeting or meet with the panellists in the course of the exercise.

- *Meeting Report*

  On completion of the meeting, THE WEINBERG GROUP drafted a detailed record of the meeting including the panel's conclusions and recommendations. The meeting report was then circulated to each of the panel members for their review and feedback. The feedback was then incorporated and agreement gained from all panel members. This agreed record constitutes Section 2 of this report. In addition a number of panel members contributed addition reference material in support of or by way of elucidation of issues raised or points made in the course of the panel meeting. This material is attached in Annex III and indicates by which panel member it was contributed.

1.3. Panel Conclusions and Recommendations

The panel arrived at the following conclusions and recommendations to which they all agreed.

- *Main Conclusions*

  - The panel concluded that the report was very good. All agreed that it was fair, balanced, up-to-date and representative of the literature on the issues reviewed, subject to comments that more material since 2003 could have been included and some additional references to important older papers could have been included as well.
  - European Union (EU) wide policies with respect to responsible use of alcohol are neither called for nor expected to work. There was an added concern that the introduction of EU policies that are not evidence-based will incur a major risk in reducing appropriate use with its associated societal benefits.
  - Any EU policies on alcohol-related harm should be formulated and implemented taking into account regional, national and local differences in the use and misuse of alcohol.
  - While it is well recognized that there are problems associated with alcohol abuse, such as foetal alcohol syndrome and liver cirrhosis, the data show that there are no health hazards associated with the appropriate use of alcohol. When taking the social cohesion aspects into account, there are significant overall benefits associated with its moderate consumption.
  - The panel expressed concern with a tendency to attribute the effects of alcohol abuse to all drinking patterns and the likelihood of this leading to the development of inappropriate EU alcohol policy.

- *Subsidiary Conclusions*

  - The panel expressed concern at the direction taken in much of the research and the poor quality of many of the studies, making the formulating of EU-wide policy inherently risky.
  - The panellists were in consensus that there is not sufficient evidence to infer that alcohol is the major cause of societal problems such as violence or inappropriate adolescent behaviour. While more information could be collected or data from other sources analysed, doubt was expressed as to whether this additional research could fully determine if alcohol is a major cause of such behaviour.

- *Recommendations*

  - Policy initiatives must be evidence-based and demonstrate clear clinical cause and effect linkage.
  - Additional, quality, well-designed research could be conducted in the areas where there exists scientific uncertainty in order to elucidate more reliable evidence.
  - Alcohol policy initiatives should be developed in a wider context in order to understand the social, cultural and economic drivers that have prompted the recent push to enact alcohol control policies.

2. REPORT OF EXPERT PANEL MEETING

EXPERT PANEL ON ISSUES RELATED TO ALCOHOL CONSUMPTION IN EUROPE: REPORT OF MEETING

This record of the meeting together with its conclusions and recommendations has been reviewed and agreed to by all panel members.

EXPERT PANEL

The expert panel consisted of:

Prof. M. Harvey Brenner
Professor of Health Policy and Management, Johns Hopkins University, US
Professor of Epidemiology, Berlin University of Technology, Germany
Professor of Social and Behavioral Sciences, University of North Texas, Health Sciences Center, US

Prof. Marie Choquet
Research Director, National Institute of Health and Medical Research (INSERM), France

Mr. Bill Durodié
Senior Lecturer in Risk and Corporate Security, Cranfield University, United Kingdom

Prof. Jean-Marc Orgogozo
Head of the Neurology Division, University Hospital, Pellegrin
Professor of Neurology, University of Bordeaux, France

Prof. Pedro Marques-Vidal
Auxiliary Professor and Head of the Nutritional Epidemiology Group, Medical Faculty, University of Lisbon, Portugal

Dr. Myron S. Weinberg (Moderator)
Associate Professor, Department of Psychiatry, Georgetown Medical School, US

Brief biographies for each panel member are in Section 3 and detailed profiles are in Annex I. Dr. Weinberg, as moderator of the panel, was assisted by Mr. Joseph Huggard who managed this assignment for THE WEINBERG GROUP and Mr. Carlos Peza as Panel Secretary.

PROCEDURE OF THE PANEL

Each member of the panel was provided with background material prepared by THE WEINBERG GROUP in advance to assist in preparation for a one day face-to-face meeting and to allow for an extended discussion on the current knowledge in the field and the areas of interest to the brewing sector. The background material comprises Sections 4 through 8 of the report.

The intention of the panel, through its moderator, was to review and comment on the quality of background material and whether the conclusions drawn were sound. The panel was also asked to opine as to the potential implications for policy in these areas.

RECORD OF THE MEETING

The meeting was opened by Dr. Weinberg who reminded the panel of the tasks at hand:

- To determine if the background material represented a fair, balanced, up-to-date and representative review of the literature on the issues being considered.
- To discuss and formulate views as to the policy implications of the data presented in the background document.

In order to facilitate the panel discussion, Dr. Weinberg posed a series of questions to the panel following the background document. These ranged from general questions related to the balance and scientific validity of the literature review to detailed questions on specific scientific and policy points.

Background Material

Is the background material a fair, balanced, up-to-date and representative view of the literature in the selected areas of discussion?

The panel agreed the background material provides a well-balanced, state of the art compilation of the current knowledge in the field. Professors Choquet and Orgogozo felt that there could have been more use of very recent material (e.g., since 2003). Prof. Orgogozo suggested that some older references be added.

The panellists were unanimous in their belief that research in these areas is scientifically weak and presented a number of factors for such weakness. This weakness was inevitably reflected in the report, but was not a fault of the report which reported fairly and accurately on the science available in the field.

Prof. Brenner suggested that some basic principles in epidemiology have not found their way into the field of alcohol research. There is a lack of attention to research methodology which requires proper statement of the hypothesis being investigated and the background for the work being proposed.

For example, there is little discussion of research design, a lack of measurement of the impact and effect size, no discussion of controls (confounders or effect modifiers) as well as a lack of discussion of contextual issues related to the consumption of alcohol such as the ecology of consumption behaviour. The research produced in the field is, therefore, fragmented and unrelated, making it difficult to make comparisons or generalisations. He also made the point that much of the problem related to the manner in which the data were analysed, and that an objective, rigorous approach using all the data currently available would lead to significant additional insights. He also criticized the fact that the fundamental reason as to why people drink is not being researched. He suggested that people drink because they find it pleasurable and that drinking brings social benefits.

Mr. Durodié echoed Prof. Brenner's view that there is a lack of methodological substance in the field. Many times researchers in the field begin with an assumption and go out and look for the problem, leading to a "conclusion in search of data." His view was that any research must be broadened to include the issues of why and in what context.

Mr. Durodié maintained that the key question was why there has been an explosion in the number of alcohol consumption-related studies produced recently. This, he explained, was mirrored in the amount of work being carried out in other health and risk-related fields such as chemicals, pesticides and terrorism. He posited that key drivers in the research in the field of alcohol and other areas were more social and political in character rather than scientific. This, he explained, characterised a society that was becoming less and less connected in a social sense, with a perceived decline is social order, that was self-obsessed and where the elites struggled to connect and be relevant. Hence their focus on health fears reflected efforts to reconnect.

Prof. Orgogozo noted that alcohol and alcohol research live in a difficult context in which social issues become part of the research. This is partly due to the special nature of alcohol which is covered by nutritional literature but is not food, is part of the addiction literature but is a legal substance, and is discussed in sociology because of its role in social and moral associations. This difficult context makes it hard for sound science to be produced unless the context of use is part of the study.

Both Profs. Orgogozo and Choquet discussed the fact that in alcohol research mostly harmful effects seem to be studied and that there exists very little literature on beneficial effects. This may be due to the fact that the research is supported by governments which are interested in the reduction of risk to the population. Prof. Marques-Vidal also noted that this may be due to the agenda-driven funding of research by governments.

The alcohol industry has generally been reluctant to fund research into the beneficial effects of alcohol consumption because of issues of industry competition and fears of litigation (especially in the U.S.).

However, the number of publications on the possible beneficial effects of moderate drinking has increased steadily in recent years.

Prof. Choquet wondered how many scientific papers are refused because they do not conform to conventional thinking on alcohol research. She also expressed concern that such publication bias could explain why there is a lack of literature coming from the south of Europe (including France), and the lack of literature considering the benefits of alcohol consumption. She also expressed concern that the effects of alcohol abuse are frequently attributed to moderate drinking. Prof. Choquet wondered why negative literature on the effects of alcohol consumption is predominant, while in other fields (e.g., sports activities), positive literature predominates.

Prof. Marques-Vidal agreed with the views of the other panellists and suggested that the report should also stress that alcohol effects can not be discussed in isolation. A broad variety of lifestyle factors influence the consumption patterns and the health consequences of alcohol consumption and cannot be overlooked because they are both confounders and effect modifiers in any study.

Profs. Choquet and Marques-Vidal suggested that the report should offer a broader point of view for the whole of Europe, because there seems to be a lack of reference to non-English language and non-Northern European scientific articles. They also pointed out that there may be quality issues associated with some of these articles in non-English language journals. The moderator pointed out that the literature, certainly in terms of quantity had a Northern European political bias and an English language bias. Professor Marques-Vidal did make the point that there is an existing trend towards publishing significant material in English language journals, whereas less significant material is published in other in-country journals.

Prof. Choquet also pointed out that further differentiations should be made when considering the differences in gender within regions and when considering specific age groups. In her experience significant differences do exist between males and females at various ages. For example, the research shows that there are significant differences in consumption patterns between males and females in the South of Europe, while similar differences were not observed in the North. As an example, Prof. Choquet expressed the view that Scandinavians value the mental state of being drunk while this is not the case in France or Italy. In support of her remarks, Prof. Choquet provided updated references for the European School Survey Project on Alcohol and Other Drugs (ESPAD).

European Cultural Differences and Alcohol Consumption

The panel agreed that no EU-wide policy would be effective given the differences between cultures of countries and, even, regions within countries, with respect to alcohol consumption, beverage preferences, patterns of drinking, and integration of alcohol into society.

Prof. Marques-Vidal pointed out that not only were there significant cultural differences in alcohol consumption but, in addition, the effects of alcohol consumption vary by country, region, religion, and even by individual. These differing patterns influence both the harmful and beneficial health effects of alcohol consumption and tend to be country-specific.

The panel agreed that policy should be developed according to the cultural situation in which it is to be implemented. There was consensus that it would be difficult to establish consumption rules at almost any geographical level due to the individual nature of alcohol consumption.

Total Consumption of Alcohol and Drinking Patterns: Implications for Harm

The panel agreed that there are distinct differences between total consumption and patterns of consumption. Total consumption is not the best metric on which alcohol-related policies should be based. The panel specifically felt that any measures to curb total consumption either by population or by averages for individuals within a population would not reflect the impact of use, particularly the prevalence of abuse. Prof. Marques-Vidal particularly welcomed the fact that, at long last, a report was considering drinking patterns rather than total consumption.

Prof. Brenner stated that setting EU-wide targets based on total consumption will have no effect at the individual level and that such targets may reduce the quality of life for a number of people.

Mr. Durodié noted that drinking is ultimately an individual decision, and that imposing a broad limit would not have the intended effect of reducing harm to society related to alcohol abuse.

Prof. Marques-Vidal noted that a global policy on decreasing total consumption would probably have little effect on decreasing consumption among excessive drinkers, while effectively decreasing consumption among moderate drinkers. This could reduce the beneficial effects of moderate consumption. He also noted that opposite effects are seen at different stages of the lifecycle both at the biochemical and the medical level. Any government policy may exaggerate these effects if it is not tailored to individual needs. Prof. Orgogozo suggested that the effects of alcohol consumption may differ between younger and older individuals.

The moderator suggested and the panel agreed that if policy-makers addressed the wrong issues, the inherent delay until this error was discovered would result in significant damage to society, in that the real problem would continue and adverse effects of the policy would accumulate.

Based on cultural differences and need to understand *individual* patterns of consumption, no pan-European policy on consumption could be effective to affect alcohol consumption in society and thus should not be considered.

Recognizing the reasons why individuals consume alcohol, the effects of the environment on the individual, and differences in individual patterns of consumption, the panel concluded that no definitive statements could be made about alcohol as a cause of harm or benefits in population groups. With such recognition, there is no rationale at present for pan-European policies about alcohol consumption.

Risks and Benefits of Alcohol Consumption: The Role of Moderate Drinking

Prof. Orgogozo and Mr.Durodié suggested that there is no more evidence of a strong causal link for the benefits of alcohol consumption than there is for harms. Clearly, there are individuals or subpopulations for which drinking is inappropriate.

Prof. Brenner noted that for those who drink appropriately there is no evidence of harm and hence they should not feel faced with a choice of risk versus health benefits.

Prof. Orgogozo framed the issue differently, saying that there was over-focus on adverse effects of misuse and health-related benefits of moderate consumption. This obscures the fact that there are large hedonic and social benefits associated with moderate drinking. Thus it could be better stated that no harm resulted from appropriate drinking behaviour, and that there was a significant net social benefit.

Prof. Orgogozo echoed Prof. Brenner's comments and noted that attributable risk estimates rarely are made at the population level for moderate drinkers. He pointed out that, in the very worst case, it is possible to say that there are no harms associated with appropriate consumption, and given the significant social, economic, taxation and employment benefits derived by societies, it made no sense to try to restrict what is a pleasurable activity.

Both Professors Marques-Vidal and Choquet agreed with these sentiments.

The panel agreed that on balance, taking all of the potential injuries associated with alcohol misuse and all of the personal and social benefits of use, there is a net benefit to the moderate and responsible consumption of alcohol.

Adverse Social Consequences of Alcohol Consumption

The panel agreed that the role of alcohol in adverse social behaviours is unclear. While there seems to be an association between the consumption of alcohol and adverse social consequences such as violence, productivity loss, and suicidality, this does not mean there is causation. Prof. Marques Vidal said that he saw association but not causation. Each of these behaviours is the result of many factors of which alcohol may be one but not the most important one. Excessive drinking may be a consequence, not the cause, of social misconduct.

Prof. Brenner remarked that on the social phenomena with respect to productivity, the methodology used in these studies is far weaker than in other aspects of alcohol consumption research, and that causal relations are entirely open and poorly researched.

Prof. Choquet noted that while there is an association between alcohol consumption and violence, there is no evidence of a causal relationship. A number of risk factors other than alcohol consumption are also related to violence. She highlighted the fact that many longitudinal studies show that aggressive behaviour is exhibited before alcohol consumption begins.

Mr. Durodié noted that violence is a subjective term which is fairly nebulous and elastic. Academic literature needs to be distinguished from what is reported in the media.

Moreover, Mr. Durodié cautioned that there is a danger when policy focuses on extreme behaviour such as alcohol abuse. This over-focus has an inherent risk of normalising extreme behaviour and marginalising normal behaviour. There needs to be an appropriate social targeting of resources. Additionally, using alcohol consumption as an excuse for violent behaviour excuses people from the responsibility of their actions.

Prof. Marques-Vidal remarked that there is a constellation of factors involved in violence and that isolating alcohol as the only factor is very risky, noting that the correlation between the consumption of alcohol and violence does not equate to causation.

Prof. Brenner noted that a multivariate analysis could be conducted to isolate the causal order of events. Time occurrence and violent behaviour could be studied in relation to alcohol consumption, but other variables such as unemployment, income loss, and other indicators would also have to be taken into account.

Influences on Adolescence Drinking

After a discussion on the issue of adolescent drinking, where intra-country differences and the fact that adolescents are very different from adults were raised, the panel agreed that the best manner in which to proceed on adolescent drinking is to enforce the current in-country youth purchasing laws.

The panel generally felt that there is there is not enough evidence to substantiate a link between alcohol advertising and consumption. Prof. Brenner emphasised that there is a need to clearly demonstrate consequential harm that may result from advertising.

Prof. Choquet stated that differences in the effects and prevalence of adolescent drinking among European countries are as significant as with adults, and that the convergence hypothesis certainly does not apply to young people. There are differences not only by country but also by gender. Among the differences in the regions of Europe are: the reasons for consuming alcoholic beverages (e.g., socialization vs. intoxication); social processes of tolerance or intolerance; and social patterns of consumption (e.g., alcohol consumed as part of the meal, age of socialization, and setting).

The panel also agreed with the conclusion of the report that greater heterogeneity within a country creates apparent homogeneity when aggregated at the EU level. Given the current data you cannot have an EU-wide policy.

Prof. Choquet added that the data associated with binge drinking are very poor, as the questions asked in this research are subjective.

Mr. Durodié cautioned that most of what is broadcast by the media regarding adolescent drinking tends to be anecdotal and should not be considered as scientific.

Prof. Brenner discussed the implications of adolescent drinking and possible substitution effects for alcohol should further restrictions be enacted on adolescence drinking. He placed the following question to the panel: "Will the restriction of alcoholic beverages lead to other drugs or does alcohol consumption act as a gateway drug?"

Prof. Choquet stated that in France, daily consumption of tobacco is more prevalent than daily consumption of alcohol, there is currently the same proportion of regular cannabis users and regular alcohol consumers in the over-16 age range, and young people view alcohol, especially wine, consumption as something that "old" people do.

Mr. Durodié noted that there are different reasons for the use of alcohol versus other drugs. Most people use alcohol for socializing, bringing people together, while the use and the experience of illegal drugs is less a social activity and more an individual action.

Prof. Orgogozo remarked that there is no health benefit in adolescent drinking. As to the question of harmonization of adolescent drinking laws at an EU-wide level, Prof. Orgogozo noted that if new evidence of harm were found, then new restrictions could be applied. However, there is no evidence of harm in the responsible use of alcohol at this time given the weakness of the data. Obvious evidence for changing the current laws would have to be produced.

Prof. Brenner remarked that the data on the influences of advertising on adolescents is anecdotal and there is no epidemiological evidence on this subject. He pointed out that it is not easy to use the effects of alcohol sales as a metric for alcohol consumption. Scientists are not performing the appropriate studies. A connection cannot be made at this time. In order to establish the risk factors, strong multi-site studies will need to be conducted to establish if a link exists. It may be possible to carry out such a comparative study using currently available data. No argument for policy can be made without additional data.

Mr. Durodié remarked that broader social trends need to be examined. This will allow us to understand the problem with adolescent drinking, if there is a problem. Adolescent drinking is not a new problem. The question that should be asked is what has changed in society that has created the perception that this is an urgent problem.

CONCLUSIONS

The last session provided the opportunity for the panel to draw conclusions from the discussions. The panel arrived at the following conclusions and recommendations to which they all agreed.

MAIN CONCLUSIONS

- The panel concluded that the report was very good. All agreed that it was fair, balanced, up-to-date and representative of the literature on the issues reviewed, subject to comments that more material since 2003 could have been included and some additional references to important older papers could have been included as well.
- European Union (EU) wide policies with respect to responsible use of alcohol are neither called for nor expected to work. There was an added concern that the introduction of EU policies that are not evidence-based will incur a major risk in reducing appropriate use with its associated societal benefits.
- Any EU policies on alcohol-related harm should be formulated and implemented taking into account regional, national and local differences in the use and misuse of alcohol.
- While it is well recognized that there are problems associated with alcohol abuse, such as foetal alcohol syndrome and liver cirrhosis, the data show that there are no health hazards associated with the appropriate use of alcohol. When taking the social cohesion aspects into account, there are significant overall benefits associated with its moderate consumption.
- The panel expressed concern with a tendency to attribute the effects of alcohol abuse to all drinking patterns and the likelihood of this leading to the development of inappropriate EU alcohol policy.

Subsidiary Conclusions

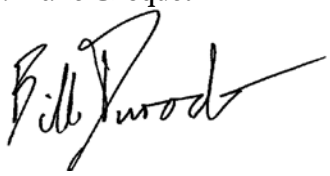
- The panel expressed concern at the direction taken in much of the research and the poor quality of many of the studies, making the formulating of EU-wide policy inherently risky.
- The panellists were in consensus that there is not sufficient evidence to infer that alcohol is a major cause of societal problems such as violence or inappropriate adolescent behaviour. While more information could be collected or data from other sources analysed, doubt was expressed as to whether this additional research could fully determine if alcohol is a major cause of such behaviour.

RECOMMENDATIONS

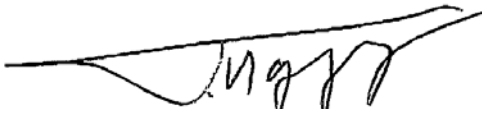
- Policy initiatives must be evidence-based and demonstrate clear clinical cause and effect linkage.
- Additional, quality, well-designed research could be conducted in the areas where there exists scientific uncertainty in order to elucidate more reliable evidence.
- Alcohol policy initiatives should be developed in a wider context in order to understand the social, cultural and economic drivers that have prompted the recent push to enact alcohol control policies.

Prof. M. Harvey Brenner

Prof. Marie Choquet

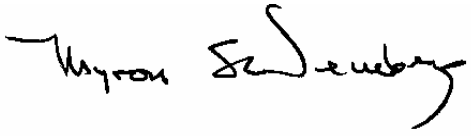


Mr. Bill Durodié



Prof. Jean-Marc Orgogozo

Prof. Pedro Marques-Vidal



Dr. Myron S. Weinberg (Moderator)

3. EXPERT PANEL MEMBERS

Prof. M. Harvey Brenner

M. Harvey Brenner is currently a Professor of Health Policy and Management at the Johns Hopkins University School of Public Health and Department of Sociology. He is also a Professor of Epidemiology at the Institute for Health Sciences, Berlin University of Technology and Professor of Social and Behavioral Sciences at the University of North Texas. He previously held faculty positions at Yale University School of Medicine, Department of Epidemiology and Public Health and Department of Sociology. He received a PhD in sociology from Yale University, where he engaged in graduate study in medical sociology, econometrics and biostatistics.

Professor Brenner's research has focused on the impact of economic and employment changes on illness and mortality patterns in the United States, Europe, Japan and Australia.

Prof. Marie Choquet

Marie Choquet is a Research Director at the National Institute of Health and Medical Research (INSERM) in France. She received a Master's degree and PhD from the University of Louvain.

Professor Choquet's research focus is adolescent mental health, in particular regarding drug consumption, suicidal behavior, eating disorders, violent behavior and delinquency. Marie Choquet has published a large number of articles and has authored international reports and chapters for books in her fields of research. She has also participated in several international research projects, including the European School Survey Project on Alcohol and Other Drugs (ESPAD), which examined drug consumption among school children in Europe, and research on alcohol consumption and alcohol-related problems among women in European countries (Biomed II).

Mr. Bill Durodié

Bill Durodié is Senior Lecturer in Risk and Corporate Security at Cranfield University. He was previously Director of the International Centre for Security Analysis, and Senior Research Fellow in the International Policy Institute, within the War Studies Group of King's College London. Mr. Durodié has received degrees from Imperial College, the London School of Economics, and New College Oxford. He is a Fellow of the Royal Society for the Arts (FRSA), an Associate Fellow of Chatham House (the Royal Institute of International Affairs), an Associate of the Royal College of Science (ARCS), a Member of the Society for Risk Analysis, and an Advisory Forum Member of the Scientific Alliance.

His main research interest is into the causes and consequences of contemporary consciousness of risk as well as the use of scientific evidence in policy development. He is also interested in examining the erosion of expertise, the demoralisation of élites, the limitations of risk management and the growing demand to engage the public in dialogue and decision-making in relation to science. His work has

appeared and been commented on in a wide range of publications, and he is regularly requested to provide expert commentary for television and radio broadcasts.

Prof. Jean-Marc Orgogozo

Jean-Marc Orgogozo is currently Head of Neurology at the University Hospital of Bordeaux and is also a member of the INSERM Epidemiology Unit (U-330) research team. He received a medical degree from the University of Bordeaux, France, and qualified as a neurologist after gaining degrees in Nuclear Medicine and in Physiology.

Professor Orgogozo is on the board of Neurology Experts of the World Health Organization (WHO). He is past Chairman of the European Union Affairs Committee of the European Federation of Neurological Societies, past-Chairman of the European Stroke Council, member of the Stroke Council of the American Heart Association and member of the International Affairs Committee of the American Academy of Neurology. Professor Orgogozo is on the Editorial Board of Alcohol in Moderation (AIM) and is the Past President of the 'Wine and Health' Experts Group of the Office International de la Vigne et du Vin (OIV).

Professor Orgogozo has published numerous articles and several books, primarily related to cerebrovascular diseases, dementia and Alzheimer's disease.

Prof. Pedro Marques-Vidal

Pedro Marques-Vidal is Auxiliary Professor and Head of the Nutritional Epidemiology Group at the University of Lisbon, where he is a member of the Nutrition and Metabolism Research team. He received a medical degree and a PhD in Biochemistry from the University of Toulouse in France. He also holds a Master's degree in Human Pathophysiology, Atherosclerosis and Thrombosis from the University of Toulouse and a Master's degree in Statistics and Health from the University of Paris.

Professor Marques-Vidal's primary research area is nutritional epidemiology, with a particular focus on the relationship between alcohol intake and cardiovascular risk factors. He conducted research for the multinational World Health Organization Monitoring of Trends and Determinants in Cardiovascular Disease (WHO MONICA) project. He is currently studying the trends and determinants of adult and child obesity in Portugal.

Dr. Myron S. Weinberg (Moderator)

Myron S. Weinberg founded THE WEINBERG GROUP INC. in 1983. Dr. Weinberg provides services in product defense, technically oriented litigation, regulatory advice and compliance, policy development, and research and development organization. Prior to founding THE WEINBERG GROUP, Dr. Weinberg was senior vice president at Booz, Allen & Hamilton, Inc., where he directed biological, chemical, environmental, and regulatory activities and where he was President of Foster D. Snell, Inc., a laboratory that conducted product development, testing and evaluation

services as well as chemical, biochemical, and toxicological analyses. Currently, he is an associate professor in the Department of Psychiatry, Georgetown Medical School in Washington, DC, and an associate professor in the Department of Pharmacology and Toxicology, Rutgers University, in New Brunswick, New Jersey.

Dr. Weinberg received his Ph.D. from the University of Maryland in Medicinal Chemistry and Pharmacology. Dr. Weinberg also received a Doctorate in Philosophy from the University of Maryland. Dr. Weinberg has written two books, has been granted eight patents, and has authored or co-authored numerous scientific and other articles.

4. BACKGROUND REVIEW - EUROPEAN CULTURAL DIFFERENCES AND ALCOHOL CONSUMPTION

4.1. Introduction

The countries that comprise the European Union are culturally diverse in numerous aspects. This diversity also extends to the perceptions and behaviours associated with alcohol consumption. Each country is characterised by differing total amounts of alcohol consumed and different patterns of consumption, and varying prevalence of alcohol-related health and social problems. The majority of the European drinking population can be classified as light or moderate drinkers (Rehn et al. 2001). However the proportion of the abstaining and heavy drinking populations varies between countries, largely as a result of cultural differences (WHO 2004).

The consumption of alcoholic beverages is a culturally-bounded phenomenon; a number of social, political and cultural factors have been reported to influence drinking behaviour (Kuntsche et al. 2004, Bloomfield et al. 2002). Conversely, societal policies and expectations also reflect a variety of cultural perceptions and beliefs related to the drinking of alcoholic beverages (Heath 1995).

Recognizing that European countries are marked by distinct traditional attitudes and practices related to alcohol, researchers have devised a number of systems of classification to define these characteristics. These systems include categorisation by: per capita consumption levels; geographical region; the presence or absence of sustained temperance movements; traditional beverage preferences; and rates of abstinence. This section provides an overview of those different systems of classification as well as other cultural factors that influence drinking behaviour.

Beliefs and practices related to alcohol consumption are subject to change over time. Recently, it has been reported that as European cultures become more ethnically diverse and as the availability of different types of alcoholic beverages increases in most countries, drinking behaviours and beliefs may be becoming more heterogeneous at a national level, and historic national preferences may no longer necessarily predict drinking behaviour (WHO 2004, Bloomfield et al. 2003, Social Issues Research Centre (SIRC) 2000). However the significance of these reported shifts in drinking behaviour has not been elucidated.

4.2. Alcohol in European Culture: History

Throughout ancient and modern history, alcohol consumption has been widespread in nearly all European cultures. In even the earliest societies, alcohol became integrated into mythology, religion, ritual, culture and economy (SIRC 2000). Alcohol drinking is, among almost all cultures, a social activity. Alcohol may function to facilitate social bonding through rituals associated with its use (i.e., communal gatherings in which alcohol is shared to help foster and define social relationships) (Heath 1995, SIRC 2000). Almost all societies have establishments dedicated to social drinking, as well as particular norms associated with when and what people may drink. Alcohol drinking is often a part of small social transitions, such as ending the work day, or large social transitions, such as birth, coming of age or marriage celebrations.

Alcohol is considered a 'symbolic vehicle for identifying, describing, constructing and manipulating cultural systems, values, interpersonal relationships, behavioural norms and expectations' (SIRC 2000).

Alcohol consumption is associated with a wide range of benefits and detrimental effects, but those perceptions and outcomes vary across cultures. There is extensive data related to alcohol-related problems—the bulk of the literature comes from Northern European countries or other places with higher prevalence of alcohol-related problems. Not surprisingly, considering that perceived problems are key drivers to investigation, comparatively less data exist on 'normal' drinking or on countries that experience fewer alcohol-related problems (SIRC 2000). Therefore it is appropriate to look at cultural settings that determine expectancies and definitions of appropriate and inappropriate behaviour (SIRC 2000). Differing patterns of use coincide with differing perceptions, expectations and societal norms, although it remains to be elucidated to what extent perceptions influence behaviour, or behaviour influences perception (SIRC 2000).

4.3. Cultural Factors that May Influence Drinking Behaviour

The behaviours and beliefs surrounding the consumption of alcohol are complex. Its consumption across cultures is recognised by both positive and negative consequences, and a great number of moral, religious, legal and social prescriptions and proscriptions have been devised to address such consequences. The result is that alcohol is related in some way to many aspects of culture (Heath 1987). Data suggest that the setting in which people drink affects why and how they drink and how they respond to alcohol, demonstrating how culture influences drinking behaviour. According to Bloomfield et al. (2002), 'drinking is a complex, dynamic, culturally and socio-demographically 'bounded' phenomenon that can vary extensively within countries and societies as well as in between.'

A number of factors have been reported to influence drinking behaviour. These factors include age, gender, socioeconomic status, personality characteristics, motivations, expectations, familial influence, peer pressures, and social, political and cultural factors (Kuntsche et al. 2004). Research suggests that the contribution of these different factors to shaping behaviour varies across cultures. This is especially true in today's multicultural and multiethnic societies; diversity of belief and practice translates into widely varying patterns of consumption.

4.4. Categorisation of Consumption

In recognition of differing attitudes and beliefs across cultures regarding alcohol, multiple systems of classification have been utilised by researchers to describe the general beliefs of a majority of a population (Bjarnason et al. 2003). Countries have been classified according to high or low per capita alcohol consumption, categories that have been correlated with other factors (e.g., distinct beverage preferences, history of temperance movements, alcohol-related problems). Terms used to describe countries with high per capita consumption include 'wet', 'prescriptive', 'permissive' and 'non-temperance'; terms used to describe countries with low per capita

consumption are 'dry', proscriptive' and 'temperance' (Peele 1997, Bjarnason et al. 2003, Bloomfield et al. 2002, Bloomfield et al. 2003).

Trends in beliefs and practices surrounding alcohol also have been described using geographical models, most notably the Northern (including Eastern) vs. Southern (including Mediterranean) European model. Historically it has been well accepted that patterns of alcohol consumption differ significantly between Northern and Southern Europe (SIRC 2000, Room 1997).

It is important to recognise that any system of classification used to generalise the behaviour or preferences of a culture will have exceptions. In an effort to identify themes and similarities between cultures, researchers have devised these classification methods to help simplify some of the inherent complexities within the field of alcohol studies. Therefore the broad categorisation methods explored below are not absolute, and instead are general classification systems that have been often utilised in the literature to make a very complex area more amenable to analysis.

- **Southern European Cultures**

Generally speaking, Southern European cultures are traditionally marked by the integration of alcohol in daily life. These countries (e.g., Spain, Italy, France) are typically defined by low rates of abstinence and high per capita consumption at low to moderate levels on a daily basis, with the majority of the consumption occurring in integrated social settings, such as at meals or at family gatherings. Southern European countries tend to be wine-producing countries (Kuntsche et al. 2004, Room 1997, Peele 1997). Alcoholic beverages are reported to be appreciated for their nutritional value and taste, and drinkers are expected to display few behavioural changes when consuming (Engels and Knibbe 2000, Room 1997). Southern European countries on the whole incorporate the use of alcohol into social settings with fewer alcohol-related problems (Room 1997).

Several studies from Spain and Portugal characterise the majority of the population as daily or weekly light to moderate drinkers (1-39 and 40-79 grams of alcohol daily or weekly, respectively) (Alvarez et al. 1993). In one study of a population from Castile and Leon, the largest region in Spain, 26.2% of the population consumed alcohol daily, with 66.6% of the population consuming alcohol at least once weekly. Abstainers comprised a small percentage of the population, and heavy drinkers[1] comprised only 3% of the population. Similar trends are discussed in a study on the consumption of alcohol using data from the Spanish National Health Survey (Guallar-Castillon et al. 2001). In this study, half of the population reported consuming alcohol regularly, with light (1-2 drinks per day) to moderate (3-4 drinks per day) consumption being the most frequent pattern of use.

In Greece, another country with a long history of wine production, consumption of alcohol is viewed as a traditional, socially accepted method for socialising, especially among men. Here, as in other Southern European cultures, alcohol drinking is integrated into social and religious settings, and drinking is common with meals and

[1] Heavy drinkers defined as individuals who consumed more than 80 grams of alcohol per day

in familial environments. According to a 1995 study, over 90% of the Greek population consumes alcohol, the majority being moderate consumers. Additionally, while per capita consumption has increased, rates of alcohol dependence have remained lower than those of Northern European countries (Madianos et al. 1995).

Studies focusing on alcohol consumption in Southern European countries are fewer in number than those addressing drinking in Northern European countries, due in part to the societal drive to address certain alcohol-related problems that tend to be more prevalent in Northern Europe (SIRC 2000). However, studies that do characterise the Southern European or Mediterranean pattern of drinking present data in support of the previously mentioned model.

- **Northern and Eastern European Cultures**

Northern European countries (e.g., Sweden, Norway) and Eastern European countries are characterised by lower per capita consumption compared to the rest of Europe. Drinking occasions are less frequent but marked by higher volumes of intake at each occasion. Rates of abstainers are higher in these countries, and the beverages of choice tend to be either beer or spirits (Kuntsche et al. 2004, Room 1997, Peele 1997, Bloomfield et al. 2003). The appreciation of the intoxicating properties of alcoholic beverages is part of individual and societal perception (Engels and Knibbe 2000, Room 1997). This contrasts with the view in Southern European countries, cited above, that 'drinkers are expected to display few behavioural changes when consuming'.

Sweden, Norway and Iceland are all marked by lower per capita consumption than countries in Southern Europe. However, alcohol drinking typically occurs sporadically and in high volumes. In Iceland, 42.7% of male drinkers and 20% of female drinkers are characterised as heavy episodic drinkers, consuming five or more drinks in one sitting at least once a month in the last year (WHO 2004).

The United Kingdom, is characterised by a higher population of abstainers (12%) than in many Southern European countries, yet alcoholic beverages are often consumed in less frequent, but larger quantities (WHO 2004). The United Kingdom, in contrast to other Northern European countries, is characterised by high per capita consumption, largely due to the number of heavy drinkers and heavy episodic drinkers. WHO reported that 17% of adults in the United Kingdom can be classified as heavy episodic drinkers, those that consume six or more drinks per occasion at least once weekly (WHO 2004).

Poland, for example, is largely a spirits consuming country, with drinking patterns also tending toward infrequent but heavy consumption. Abstinence estimations range from 9 to 23% due to differing understanding of the term abstention. Poland also experiences high prevalence of heavy episodic drinkers and high prevalence of alcohol-related problems (Cherpitel et al. 2004).

4.5. Regional Differences

Another demonstration of the complexity of cultural influences on drinking behaviour is the existence of regional differences in perceptions and practices within a country. For instance, Larsen and Nergård (1990) reported differences between perceptions of alcohol and its potential social consequences in the Saami and Norwegian populations of Northern Norway arising from the differences in the integration of alcohol in each society. Cultural observations indicate that the Saami population is more permissive of alcohol consumption than the Norwegian population, despite relatively similar levels of alcohol consumption and rates of alcohol dependence.

In Portugal, a wine-producing country with a population historically characterised by daily wine consumption, mostly at meals, a recent study suggests that overall consumption is decreasing, and variations in consumption are found when comparing the northern and southern regions of the country. Alcohol consumption is more prevalent in the north and the beverage of preference is wine, whereas in the south, prevalence of alcohol consumption is lower and beer is the preferred beverage (Marques-Vidal and Dias 2005).

4.6. Religious Differences

Religious affiliation has been demonstrated to play a significant role in determining whether or not an individual consumes alcohol and other facets of drinking behaviour. Many major world religions (e.g., Islam) advocate abstinence from alcohol for its followers, with the most major exception being Christianity, although some denominations of Christianity urge abstinence as well (Heath 1995, Room 1997). Catholicism incorporates alcohol into sacrament, while some Protestant groups view abstinence as integral in faith (Heath 1995). A study of twenty one Western European nations determined that religion was associated with significant differences in both alcohol consumption and patterns of use. Catholic countries consumed significantly more alcohol than Protestant countries, and consumed twice the percentage of wine as Protestant countries (Peele 1997).

There is a strong though not absolute correlation between religious affiliation and histories of temperance movements worldwide. Protestant countries on the whole also have been witness to more temperance movements throughout history (Peele 1997). With this in mind, Levine (1992) introduced the concept of temperance and non-temperance cultures as a means of categorizing Western European countries and their respective drinking views and habits. Cultures that witnessed sustained temperance movements in the 19th century were considered temperance cultures. Temperance cultures tend to be strongly concerned with alcohol abuse and often alcohol consumption in general, as well as methods to decrease the problems associated with excessive alcohol consumption. Temperance cultures are also predominantly Protestant. Non-temperance cultures tend to be Catholic countries that experience fewer alcohol-related problems, and thus tend not to display the same concern regarding alcohol consumption as do temperance cultures. All temperance countries in this study consumed less alcohol per capita than any non-temperance country (Peele 1997).

Temperance cultures, as defined by Peele (1997), include: Iceland, Norway, Sweden, Finland, Ireland (in spite of its Catholic tradition), the United Kingdom, Canada, the United States, New Zealand, and Australia. Non-temperance cultures include: The Netherlands, Italy, Denmark, Belgium, Portugal, Spain, Switzerland, Austria, Germany, France, and Luxembourg.

4.7. Other Differences

- **Abstinence Rates**

An individual may abstain from alcohol for a variety of reasons, including but not limited to religious faith, personal preference, health concerns, and preservation of sobriety (Heath 1995). Abstinence rates vary across Europe, from 5% in Denmark to 38% in Romania as reported by the World Health Organization (WHO) in 2004. However, estimations of abstinence rates and definitions of abstinence also vary. As reported in a review by Bloomfield et al. (2003), across several studies, Denmark had the lowest abstention rate among men and women, whereas Portugal, Sweden and Finland had higher abstention rates compared to the other countries studied. One study conducted by the European Union (EU)[2] identified France as having the highest abstention rate of six EU nations. As these studies included different countries in the analysis and utilised varying methods, clear conclusions are difficult to draw. However, the discrepancies in the reported findings demonstrate the complexity of accurately and consistently reporting data on drinking behaviour.

- **Beverage Preferences**

European countries have often been defined in the literature in general terms by the alcoholic beverage most often consumed by the population; preferred beverages are usually indicative of what types of beverages are produced in the region. WHO categorises the countries as preferring beer, wine, or spirits, using comparisons to average consumption across Europe. Some countries fit into more than one group, and several countries' consumption of all types of alcoholic beverages is lower than the average, making it difficult to categorise them in any category (Iceland, Malta, Norway and Sweden) (Rehn et al. 2001).

According to Rehn et al. (2001), the countries that prefer beer include: Austria, Belgium, Czech Republic, Denmark, Finland, Germany, Ireland, Luxembourg, the Netherlands, Slovakia, and the United Kingdom. Wine-preferring countries include: Austria, Denmark, France, Greece, Hungary, Italy, Luxembourg, Portugal, Spain, and Switzerland. Spirits-preferring countries include: Bulgaria, France, Greece, Hungary, Latvia, Poland, Romania, the Russian Federation, Slovakia and Spain. That countries appear on more than one list can probably be interpreted as related to which beverage the country produces or that there are significant groups with strong preferences in these countries. The issue, as indicated below, is further complicated and potentially influenced by variations in alcohol consumption that occur with the changing seasons.

[2] Leifman (2002) as cited in Bloomfield et al. (2003)

- **Differing Problems or Awareness of Problems**

It is important to acknowledge that drinking patterns are associated with a range of health and social consequences. Research has demonstrated that different cultures experience different rates of alcohol-related problems and have differing awareness of the existence of those problems. Measuring awareness or perception of problems is difficult, and such studies are subject to limitations associated with the lack of objective measures. Using the prevalence of Alcoholics Anonymous (AA) groups in a country as a potential indicator of the existence of alcohol-related problems as well as concern about those problems, Peele et al. (1997) reported that the total per capita consumption of alcohol is negatively associated with the number of AA groups in that country. For instance, Iceland, a temperance culture with one of the lowest per capita consumption rates in Europe, had the highest number of AA groups. France, a non-temperance culture and the country with the second highest per capita consumption in the study[3], had significantly fewer AA groups than most of the other countries studied (Peele 1997).

4.8. Limitations of Current Studies

There is some debate over how these cultural differences in consumption patterns can be integrated into an epidemiological model. Many existing epidemiological studies suffer from multiple limitations and thus are of limited use. Examples of such limitations include: lack of accounting for abstinence; lack of control for confounding variables; self-reported alcohol consumption subjected to recall bias and under-reporting; and differences in quantification of alcohol intake based on differing sizes and alcohol content of beverages. Cross-cultural comparisons and aggregate studies in particular also lack power due to substantial regional differences in consumption (Bloomfield et al. 2003).

The cultural distinctions in total consumption and patterns of drinking have not been successfully implemented or operationalised in many existing studies (Peele et al. 1997). More research, especially prospective research, is needed to elucidate the relationships between patterns of drinking across cultures and implications for health and society.

4.9. Convergence – Evidence of a Culturally Diverse Europe?

Drinking patterns, like many behaviours, are susceptible to social, economic and political influences and often change as cultures evolve. The Member States of the EU are experiencing significant trends toward more multicultural and multiethnic societies. Diversity of belief, practice and preference translate into widely varying patterns of alcohol consumption between subpopulations within the Member States. Recent debate has arisen over whether drinking trends are becoming more harmonised—that the traditional notion of ‘dry’ and ‘wet’ cultures is being replaced by a homogenisation of consumption trends and beverage preferences (Bloomfield et al. 2003). National governments often are interested in collecting per capita

[3] In Peele (1997), Luxembourg was reported to have the highest per capita consumption and fewest AA groups; however it was excluded from this report because of perceived methodological issues with per capita consumption data

consumption data or other comparative rankings of alcohol consumption (Bloomfield et al. 2003), leading to data being most frequently gathered at a national level. Given the expanding diversity of cultures in all Member States, it is reasonable to propose that greater heterogeneity within a country creates apparent homogeneity when aggregated at the EU level. This view is further supported by the fact that production and distribution of alcohol is increasingly globalised, making new types of beverages more available to a wider range of countries (Room 1997).

Multiple studies cite decreasing wine consumption and increasing beer consumption in Southern European countries; overall increasing total consumption of alcohol in Northern European countries and increased wine consumption have also been reported (WHO 2004, Bloomfield et al. 2003, Marques-Vidal and Dias 2005, Alvarez et al. 1993). There is also evidence that the distribution of drinking patterns may be changing. Abstinence rates in Scandinavia are reportedly declining, but increasing in other countries (Bloomfield et al. 2003). It has also been reported that social changes in Eastern and Central Europe have resulted in traditional drinking patterns and beverage preferences being replaced by those typical of Western Europe. Additionally, Southern European countries are experiencing shifts from traditional beverage preferences and drinking patterns (ICAP 2004).

Studies suggest that young people across Europe are consuming greater volumes of alcohol than previously reported (WHO 2004, Madianos et al. 1995, Room and Makelä 2000, Bloomfield et al. 2003, ICAP 2004) and in some countries, notably in Southern Europe, youth beverage preference is shifting from wine to beer and spirits (Marques-Vidal and Dias 2005, WHO 2004). There are anecdotal reports that binge drinking behaviour that has been more common in the United Kingdom may be occurring in Southern European countries (WHO 2004, SIRC 2000).

In recent years, the Netherlands has experienced more integration of alcohol consumption into daily life, and there are reports of youth being introduced to alcohol in family settings as opposed to introduction in unsupervised peer groups. This seemingly positive trend should be approached cautiously, but provides at least preliminary evidence that ambivalent cultures may be amenable to adopting less problematic drinking patterns (SIRC 2000).

According to SIRC (2000), the introduction of new beverages to a culture is sometimes associated with the adoption of drinking patterns and behaviours associated with that beverage. However, it appears that other cultures consume new beverages without adopting new drinking behaviours. These apparent shifts in drinking behaviours have captured the interest of alcohol researchers, but the outcome of these changes is not yet known.

4.10. Summary

The diversity which characterises European countries extends to beliefs and behaviours related to alcoholic beverages. The consumption of alcoholic beverages has been integrated in some sense into every European culture, and data suggest that the setting in which people drink affects why and how they drink and how they respond to alcohol. Countries vary with respect to total volume of alcohol

consumed, populations of abstainers and heavy drinkers, beverage preferences, common patterns of drinking, and integration of alcohol into society, resulting in varying types and degrees of health and social problems.

Researchers have attempted to characterise the traditional drinking behaviours of European countries according to consumption levels, geographical region, beverage preference, and a variety of other factors. Although useful for broadly characterising attitudes and practices of a majority of a population, research demonstrates that even within a country, vastly differing drinking behaviours exist. Recent debate over whether drinking behaviours are converging or just becoming more diverse within individual societies in Europe creates a challenge for alcohol studies. At this time, the supporting data and implications are unclear. Alcohol consumption in European cultures is marked by both static and dynamic elements, resulting in complex and diverse drinking behaviours.

5. BACKGROUND REVIEW - TOTAL CONSUMPTION OF ALCOHOL AND DRINKING PATTERNS: IMPLICATIONS FOR HARM

5.1. Introduction

Over the last fifteen years, research on alcohol-related health and social consequences has increased dramatically, especially among northern European countries, in an attempt to better characterise the risks and benefits associated with alcohol consumption. While alcohol studies historically focused on total alcohol consumption as an indicator of alcohol-related problems at both the individual and population level (Bobak et al. 2004, Norström 2001), it is increasingly apparent that volume alone is an incomplete predictor of risk or benefit. The importance of drinking patterns cannot be ignored in the assessment of potential harm (WHO 2004). Historically, the influence of patterns of drinking has been underestimated in the literature because many epidemiological studies have not attempted to examine them (Rehm et al. 2003b). However, numerous researchers and organisations emphasise the importance of studying not only how much people drink, but also what, when, and how often they drink (Bobak et al. 2004, Russell et al. 2004, San Jose et al. 2000, Rehm and Gmel 2003, SIRC 2000, ICAP 2005).

A large and varied body of literature exists on alcohol-related problems. Data from both individual-level and population-level studies have been used to demonstrate relationships between total alcohol consumption, drinking patterns, and harms. A growing amount of evidence suggests that drinking patterns may be more important than total alcohol consumption in determining whether an individual may experience problems related to alcohol drinking (ICAP 2004). However, it remains important to emphasise the importance of examining all of the dimensions of consumption - quantity, frequency, and variability of consumption - in order to estimate risk of consequences (Rehm and Gmel 2003).

This section includes an overview of data on total alcohol consumption and drinking patterns as they relate to the following endpoints: chronic and acute health outcomes; all-cause morbidity and mortality; prevalence of heavy drinkers; alcohol abuse and dependence; injury; and various social problems.

5.2. Drinking Patterns

Drinking patterns describe features of drinking that have been demonstrated to be important in determining outcomes. In essence, drinking patterns describe ‘how’ people drink. These features include (ICAP 2005):

- the volume an individual drinks, especially on a given occasion and how often the occasions are marked by heavy drinking;
- when people drink, whether with meals, at gatherings, and how drinking is spread out over time;

- characteristics of drinkers such as age, gender, genetic factors and health status;
- those with whom people drink – family, friends, peers and colleagues;
- where drinking takes place, whether at home, at restaurants or other public venues; *and*
- types of beverages consumed.

A common example used to illustrate the difference between patterns of drinking involves comparing an individual who consumes two drinks per day for a week with an individual who drinks seven drinks twice per week. Both individuals consume a total of fourteen drinks over the same time frame, but the patterns of drinking and potential consequences are very different. Therefore the integration of the study of drinking patterns into all alcohol epidemiologic research is necessary to improve the accuracy of risk assessment (Gutjahr et al. 2001).

Drinking patterns are marked by complexity and irregularity and thus are much more difficult to study (Russell et al. 2004, Lemmens 1995). Drinking patterns vary not only between cultures, but differ between individuals, making meaningful statistical analysis challenging and hence determining population effects difficult. Still, a significant amount of data exists which examines the volume of drinks consumed per occasion and the frequency of drinking occasions in relation to a variety of health and social outcomes. These points will be the focus of the remainder of the section.

- **Terminology Used to Describe Drinking Patterns**

It is necessary to acknowledge the multiplicity of terms that are used inconsistently in the literature to describe different drinking patterns. Also, there are inconsistencies in the terminology used to describe the potential associated harms. Due to the absence of standard definitions, where possible, terms used in this section have been defined according to the study authors' definitions or methodology.

Terms to describe high volume of alcohol consumption alone, or high volume consumption of alcohol with low or high frequency, include:

- heavy drinking;
- excessive drinking;
- problem drinking;
- harmful drinking;
- hazardous drinking;
- heavy episodic drinking; *and*
- binge drinking.

Terms used to describe lower volumes of alcohol consumption alone, or lower volume of consumption with low or high frequency, include:

- sensible drinking;
- light drinking; *and*
- moderate drinking.

Although numerous terms have been utilised to describe the types of drinking behaviour that may result in harm to the drinker or other parties, this report will use the term 'alcohol misuse'. Alcohol misuse refers to a variety of behaviours, including but not limited to: drink driving; alcohol consumption during pregnancy; and alcohol consumption that is associated with health, psychological and/or social problems. The terms 'alcohol abuse' and 'alcohol dependence' will be used as defined by the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV).

5.3. Theories on Consumption and Harm

The single distribution theory proposed by Ledermann in the 1950s put forth the idea that the prevalence of excessive drinking depends solely on per capita alcohol consumption in a culture. In the 1980s Skog revised the Ledermann theory into his 'theory of collective drinking behaviour' in recognition of the fact that the relationship between per capita consumption and prevalence of alcohol abuse was not as exact as Ledermann proposed. Skog postulated that there are multiple factors that influence drinking behaviour, but the factors do not combine consistently enough to be predictive. Skog also hypothesised that an individual's drinking behaviour is strongly influenced by the surrounding social environment, such that the consumption patterns of all subpopulations move up or down in concert with the aggregate mean change (Lemmens 1995). This theory has served as the basis for policies that aim to reduce total consumption in a population in order to reduce harm (Gmel and Rehm 2000).

Although the basic tenets of these theories have been perpetuated, there are many criticisms of the approaches used, and subsequent studies have reported that some alcohol-related problems are inversely related to per capita alcohol consumption. In an analysis of Skog's theory, Gmel and Rehm (2000) state that there is little empirical evidence to support the assumptions on which the theory is based. Results from studies examining subpopulation consumption trends along side of overall population trends have been inconsistent, and the prevalence of alcohol-related problems has been demonstrated to vary between countries with similar per capita consumption (Gmel and Rehm 2000). Additionally, population-level studies do not show that decreases in overall consumption consistently lead to decreases in alcohol-related problems (Lemmens 1995).

5.4. Population-Level and Individual-Level Data

Studies examining the relationship between alcohol consumption and harm vary widely in methodology. Some studies are population-level analyses which compare

per capita consumption figures to prevalence of a particular outcome. Per capita figures are typically calculated by dividing total consumption of the population by the number in the population (usually over the age of 15); depending on methodology used, the calculation may or may not include abstainers. Individual-level studies use surveys to examine alcohol consumption (with or without measurement of specific drinking patterns) and prevalence of particular outcomes. Both approaches have a range of unique benefits and limitations, but both face limitations including accurately measuring alcohol content in different beverages (Bloomfield et al. 2003, Rehm and Gmel 2003).

- **Benefits and Limitations of Population-Level Analysis**

Population-level analysis, particularly aggregate-level analysis, has been used regularly in epidemiologic studies on alcohol and health and social consequences. These population-level data are gathered from economic data to yield per capita consumption figures (i.e., volume of production and imports of alcohol minus exported alcohol). Data on informal alcohol production, consumption by residents outside the country, consumption by tourists, and duty-free purchases are not always available or included in analysis, potentially causing overestimation or underestimation of per capita consumption figures (Bloomfield et al. 2003). For instance, it is estimated that in Luxembourg, visitors or tourists account for a sizable portion of the alcohol consumed, which has contributed to overestimates of the overall consumption level for the actual Luxembourg population (WHO 2004).

There are potential benefits of using population-level analysis. In addition to being easily attainable and less costly to collect, data collected on an aggregate level may not be subject to certain biases found in survey-style studies and can serve as a macro-level tool for examining trends in population consumption levels (Bloomfield et al. 2003). However, aggregate-level data have a number of limitations. Studies using these data do not typically report age- or sex-specific consumption, prevalence of different drinking patterns, or characterise abstaining populations. Therefore this type of data is useful only in relatively small population subgroups in which the drinking patterns are homogeneous. Aggregate level studies often do not control for confounding factors and may also be subject to ecologic bias[4] (Bloomfield et al. 2003, Rehm and Gmel 2003). Thus, aggregate-level data cannot be used to draw individual-level conclusions.

Aggregate level analysis is a measurement that is easy to conceptualise and simple to use, especially when comparing consumption across countries. However, many researchers have pointed out that this method ignores important distinctions in individual patterns of drinking that have wide implications for harm (Russell et al. 2004, Bloomfield et al. 2003).

[4] The type of error that can occur when the existence of a group association is used to imply the existence of a relationship that does not exist at the individual level

Subpopulations

An important variable in determining risk of alcohol-related problems is the distribution of alcohol consumption among the population (Lemmens 1995). A primary criticism of the historical reliance on population total volume consumption data is that populations are not homogenous in terms of drinking patterns. As an individual's drinking pattern is shaped by a variety of social, economic, biological and psychological factors, subpopulations have been found to differ with regard to their drinking behaviours and resulting effects of consumption (Lemmens 1995, van Oers et al. 1999).

Additionally, a change in population total consumption does not necessarily imply that the change was experienced uniformly across all groups within that population. For instance, age groups and gender groups tend to experience unique trends (Lemmens 1995, Fillmore et al. 1991).

In light of the recognition that different cultures and their respective drinking patterns are not homogenous, additional research has focused on identifying substrata within all cultures that may share more homogenous drinking characteristics. These substrata are socio-demographic in nature, separating a population by age, sex, or social class.

According to Romelsjö and Lundberg (1996), classes in different social strata may experience differing economic trends or changes in social environments that could lead to the development of changes in rates of alcohol abuse, dependence, or other alcohol-related problems. If multiple strata experience changes in different directions, alcohol-related problems may change in prevalence without a corresponding change in total consumption (Lemmens 1995).

Abstainers and Heavy Drinkers

The size of the abstaining population and the inclusion or exclusion of that population in per capita estimates makes a significant difference in the outcome. There are also different kinds of abstainers (lifetime and current) that impact analysis, as current abstainers tend to suffer from more health problems and often differ in diet, religion, or socioeconomic status (Rehm 1998, Rehm and Gmel 2003). Furthermore, the proportion of heavy drinkers in a population influences the mean total consumption value. In most countries, a small proportion of individuals consume the majority of total alcohol (Gmel and Rehm 2000).

- **Benefits and Limitations of Individual Level Studies**

Individual level studies can help shed light on the ways people drink, and can be used to capture the complex nature of the quantity, frequency, and variability of alcohol consumption. However, not all individual studies examine drinking patterns, but instead use quantity-frequency measures to yield an estimate of the total volume of alcohol consumed during a particular time frame (Bloomfield et al. 2003). In this case, the frequency of drinking occasions is multiplied by the average volume

consumed per drinking occasion. Many epidemiologic studies use quantity-frequency measures to assess alcohol consumption in individuals using survey questions that ask such questions as the number of drinking occasions in the past year. However, this approach fails to account for variations in volume of alcohol consumed per occasion and changes in drinking patterns over time, and also has been criticised as it may underestimate total consumption (Rehm and Gmel 2003, Russell et al. 2004). Additionally, all retrospective individual-level studies are subject to self-reporting and recall bias. Prospective studies, while having the potential to eliminate many of these errors, are both expensive and generally of long duration.

Considering the volume of historic aggregate level data and the growing body of literature on drinking patterns, it is reasonable to assume that aggregate-level studies and individual-level studies may complement one another. Rehm and Gmel (2003) emphasise the importance of examining all of the dimensions of consumption – quantity, frequency, and variability of consumption - in order to estimate risk of consequences.

5.5. Specific Health and Social Outcomes

- **All-Cause Morbidity and Mortality**

High volume drinking alone or in concert with certain drinking patterns increases the risk of alcohol-related morbidity and mortality (WHO 2004). Generally speaking, there is evidence to support that both total volume and patterns of use are related to morbidity and mortality, as drinking patterns are thought to modify the influence of total consumption.

There are more mortality studies that examine total consumption as opposed to drinking patterns. Literature that examines patterns of consumption is underrepresented, but the studies that do exist demonstrate the importance of patterns (Rehm et al. 2001). For example, the U.S. National Institute on Alcohol Abuse and Alcoholism's 2004 report on moderate drinking recently concluded that moderate alcohol consumption was associated with reduced risk of all-cause mortality (Gunzerath et al. 2004).

Individual-Level Analysis

San Jose et al. (1999) demonstrated the importance of drinking patterns on overall health in a general population survey in the Netherlands. After controlling for total alcohol intake, light to moderate drinkers[5] were found to have lower mortality than both abstainers and heavy drinkers[6], and frequent heavy drinking episodes were associated with increased mortality rates. Infrequent heavy drinking episodes were not related to increased mortality. In another study, regular drinking has been associated with better self-reported health outcomes, independent of total alcohol consumed (San Jose et al. 2000).

[5] Light drinkers defined as individuals who consumed 1-14 drinks per week; moderate drinkers defined as individuals who consumed 15-28 drinks per week

[6] Heavy (excessive) drinkers defined as individuals who consumed >=29 drinks/week

A study of male British doctors carried out by Doll et al. (1994) also determined that the consumption of one or two units of alcohol a day was significantly associated with lower all-cause mortality than both the consumption of no alcohol and the consumption of higher amounts of alcohol (See Figure 1).

Figure 1. Annual mortality by alcohol consumption for all causes of death in men
Source: Europe Against Cancer (based on Doll et al. 1994)

Rehm et al. (2001), however, determined that both average volume of intake at an individual level as well as patterns of drinking influenced overall mortality among young people aged 15-29 in Europe. Transport accidents and self-inflicted injury were the leading causes of death in this group; death from chronic disease was not a significant occurrence in this age group.

Population-Level Analysis

In a study of fourteen European countries, Norström (2001) reported that increases in overall consumption were associated with increases in total mortality. However the association was stronger in Northern European countries than in Southern European countries. Norström and Skog (2001) determined that total consumption is an important indicator of risk of alcohol-related mortality, but acknowledged variation in rates of such harm may be attributed to different drinking patterns, especially in the case of accidental death.

Romelsjö and Lundberg (1996) studied the relationship between alcohol consumption and alcohol-related disabilities in Sweden during a twenty-five year period marked by both an increase and decrease in consumption. The authors concluded that rates of

hospitalisation and mortality due to alcohol-related problems in the population did not correspond to increases or decreases in per capita consumption. They also determined that different social classes experienced unique changes in alcohol-related harm, highlighting the notion that subpopulations vary independently from the general population in terms of drinking behaviour.

- **Chronic and Acute Health Outcomes**

There is general consensus that total volume of individual alcohol consumption is an important predictor of chronic health outcomes (e.g., liver cirrhosis, cancers, depression, epilepsy, hypertension, stroke) (WHO 2004, Rehm et al. 2003b). Patterns of drinking, however, have been demonstrated to be especially important in terms of accidents, injury, coronary heart disease, and various social problems (Russell et al. 2004, Rehm 1998, Rehm and Gmel 1999, Rehm et al. 2003b). Recent studies in the United States have indicated that volume of individual alcohol consumption does not have the predictive power for harm that was once thought, as trends between volume and harm do not necessarily parallel each other (Rehm 1998).

Accurate predictions of risk of health and social outcomes are likely to be dependent on the combination of total consumption and patterns of drinking. For example, cardiovascular disease risk is moderated by pattern of alcohol consumption, as regular, light to moderate drinkers are at a lower risk for developing coronary heart disease while abstainers and heavy drinkers are at a higher risk (Gutjahr et al. 2001). The risk of liver cirrhosis, however, is strongly linked to long-term consumption of large volumes of alcohol (Midanik et al. 1996, Lemmens 1995). Additionally, in some circumstances, consumption of any amount of alcohol may lead to increased risk of harm regardless of drinking pattern (e.g., drink driving) (Midanik et al. 1996).

Although there are many studies that have linked a variety of alcohol-related problems to individual total consumption, a growing body of literature suggests that these problems are more closely associated with heavy drinking occasions than with total consumption (Rehm et al. 2001, Room et al. 1995).

- **Injury**

Individual Level Analysis

Although a number of different factors influence an individual's risk for incurring injury, there is increasing epidemiological evidence that alcohol consumption may be one of the factors which influence some individuals' risk. A number of recent studies that have looked at the role of alcohol consumption and risk of injury in order to determine what may be considered a potentially harmful amount or pattern of drinking. The resulting data is inconclusive, although evidence suggests that heavy drinking episodes (occasions marked by higher than average intake) are associated with a greater risk of injury and more severe injury.

Intoxication is the result of drinking patterns that lead to elevated levels of ethanol in the blood which results in altered cognitive and motor activities. Factors such as age,

gender, size, general health, mood, ethnicity, use of medication, and experience with alcohol play a part in the degree of intoxication in an individual. Therefore different individuals may become intoxicated at different levels of alcohol consumption. Intoxication is associated with increased risk of injury and emergency room admission, more severe accidents and traffic fatalities (ICAP 2005).

Treno et al. (1997) suggested that the risk of various types of injury (e.g., self-inflicted, injury by third party, traffic accident) is higher when an individual's drinking pattern is highly varied (i.e., marked by irregular episodes of heavy drinking), as high variance drinkers are more likely to consume larger amounts per occasion, and also tend to have drinking patterns with less routine. The average number of drinks consumed per occasion was not related to risk of injury.

In a study of emergency services use in Poland, the authors reported that more than half of the injured male population reported feeling intoxicated at the time of injury, and nearly half of the respondents engaged in at least monthly drunkenness or met diagnostic criteria for alcohol abuse or dependence (Cherpitel et al. 2004). This further demonstrates that risk of injury is associated with individuals who display drinking patterns marked by periodic heavy drinking or alcohol consumption disorders.

- **Heavy Drinking**

Population Level Analysis

Several studies have reported a strong relationship between per capita consumption and prevalence of heavy drinkers (Gmel and Rehm 2000). However, there is ample data that suggests that high per capita consumption does not always correlate with increased numbers of heavy drinkers in a society, illustrating that there are other factors that influence an individual to drink heavily. Studies have observed varying effects of changing per capita consumption on subpopulations; therefore it is not possible to generalise that all populations or countries would experience the same effects with increasing or decreasing total consumption. In a study of differing rates of heavy drinking episodes in four Nordic countries, Makelä et al. (2001) reported that Denmark, for example, was characterised by the highest prevalence of drinkers and the highest overall consumption, but a lower prevalence of heavy drinking occasions[7] and intoxication[8]. These figures contrast with data from Finland and Norway, countries characterised by lower overall consumption but higher prevalence of heavy drinking occasions and intoxication.

In a longitudinal study over twenty years in the Netherlands during a period marked by a 300% increase in per capita consumption, Knibbe et al. (1985) found that an increase in per capita consumption was associated with an increase in the number of heavy drinkers[9]. However, a decrease in mean consumption of one subgroup (young men) was associated with an increase in the prevalence of heavy drinkers in that

[7] Heavy drinking occasions defined as consuming more than 6 drinks at a sitting
[8] Intoxication documented via self-reporting
[9] Heavy drinkers defined as those who consumed more than 22 drinks per week

group. Additionally, in another subgroup (men without religious affiliation), stable mean consumption was also associated with an increase in prevalence of heavy drinkers. Another study conducted in the Netherlands revealed that while the population studied experienced a decrease in per capita alcohol consumption of 10% between 1980 and 1995, the number of heavy drinkers[10] increased (Garretsen et al. 1999).

Data from Eastern Europe corroborates the notion that high per capita consumption is not associated with high prevalence of heavy drinkers[11], noting lower prevalence of heavy drinkers in cities in the Czech Republic and Poland (marked by high per capita consumption) as compared to one in Russia (marked by low per capita consumption) (Bobak et al. 2004).

Fillmore et al. (1991) performed a meta-analysis using twenty five studies from fourteen different countries in order to predict changes in drinking patterns in subpopulations (by age and sex) in relation to per capita consumption. The results demonstrated that 'aggregate level changes in per capita consumption do not carry equal weight among all groups in society'. The study did determine that there was a positive association between per capita consumption and prevalence of heavy drinking, but that long-term heavy drinking was not associated with increased per capita consumption.

- **Alcohol Abuse and/or Dependence**

Several studies have examined the relationship between total consumption and alcohol abuse or dependence on both the individual and the population level. Some researchers have reported that the risk of alcohol abuse or dependence increases with increasing individual total consumption, but when heavy drinking occasions are taken into account, the literature suggests that the patterns are more important than total volume consumed (Midanik et al. 1996).

Individual Level Analysis

Caetano et al. (1997) determined that the mean number of drinks consumed per day shares a linear relationship with the risk of alcohol dependence.[12] However, when more sophisticated statistical techniques were used and total volume of consumption was controlled for, the authors determined that consumption of more than five drinks per day is associated with a markedly greater risk (6-fold) for alcohol dependence.

Population Level Analysis

In a meta-analysis of studies on alcohol consumption disorders[13] in various countries in the European Union (EU), Rehm et al. (2005) determined that although the

[10] Heavy drinkers defined as those who consumed 4 drinks or more at least 21 days in a month or those who consumed 6 drinks or more at least 9 days per month
[11] Definition of heavy drinkers not given
[12] Alcohol abuse and dependence defined by the Diagnostic and Statistical Manual of Mental Disorders –IV (DSM-IV)
[13] Alcohol use disorders (AUD) are alcohol dependence and abuse as defined by DSM-IV or harmful alcohol use as defined by the International Classification of Diseases 10 (ICD-10)

countries studied had a 'relatively similar level' of overall consumption[14], wide variation existed in rates of clinically defined alcohol abuse and dependence. Prevalence rates for alcohol dependence ranged from 0.4-14.5% in males and from 0.1-4.2% in females—nearly a 20-fold difference in prevalence for both genders across cultures. They determined that per capita consumption rates were negatively correlated with rates of alcohol dependence, and that positive correlations were seen between the number of heavy drinking occasions[15] and alcohol dependence. The authors discuss various factors that could explain why the rates of alcohol abuse and dependence vary so greatly between cultures, including gender-specific abstinence or drinking patterns or age-related drinking patterns.

In Germany, another study found unexpectedly low levels of alcohol abuse and dependence despite high levels of total consumption. The study, conducted on a population in Northern Germany, determined that the population was characterised by high overall consumption and high prevalence of drinkers, but no corresponding increase in prevalence of abuse and dependence, as compared to population data in Southern Germany and the United States (Meyer et al. 2000).

- **Social Problems**

Individual Level Analysis

In a 1999 survey of the Swiss population, Rehm and Gmel studied the relationship between alcohol consumption and a wide range of social issues, including problems with police and authorities, accidents, unemployment, change in personal relationships, driver's license suspension, difficulties with others, problems with partners, problems at work, and neglecting major obligations. The authors concluded that high volume of alcohol intake per occasion – independent of overall drinking volume – predicted negative social consequences for an individual. Weekly heavy drinking[16] was the most important predictor for nearly every problem studied. High volume but less frequent drinkers were found to have more alcohol-related problems than more frequent drinkers who consume less per occasion. Unemployment and accidental injury were found to be unrelated to patterns and overall volume. In this study the only consequence found to be associated with overall volume was that of problems with police and authorities.

Russell et al. (2004) studied forty one different alcohol-related social problems and determined that problems were closely related to drinking patterns marked by heavier than usual intake and increased frequency of those occasions. They also reported that 60% of all drinkers experienced at least one alcohol-related problem, but more severe problems were experienced on occasions when alcohol consumption was higher than normal for the individual. Data from Eastern Europe has indicated that alcohol-related problems[17] were associated with binge drinking[18] episodes.

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[14] Per capita consumption ranged from 6.41 to 19.30 litres of alcohol (Rehm et al. 2005)
[15] Based on methodology of Hazardous Drinking Score (Rehm et al. 2004)
[16] Defined as consumption of five or more drinks per occasion at least once a week (Rehm and Gmel 1999)
[17] Alcohol-related problems were defined using criteria from CAGE questionnaire (e.g., social, psychological, work-related problems)
[18] Binge drinking frequency categorised as >=80g, >=120g and >=160g of alcohol in one sitting at least once a month

In a Canadian study, the authors reported that the risk of harm on multiple health and social endpoints is associated with increasing individual volume of consumption. However, independent of total volume consumed, the drinking pattern associated with the highest risk of harm was the consumption of more than five drinks per occasion at least once a month (Room et al. 1995).

Population-Level Analysis

A recent study by Bobak et al. (2004) compared patterns of drinking and alcohol-related problems in three different Eastern European populations (Czech, Polish, and Russian). The study found that the Czech population, characterised by high per capita consumption and low intake per occasion, experienced a lower rate of social, psychological and physical problems. Similar results were found in the Polish population. In contrast, the Russian population, which had lower per capita consumption and high amount of volume per occasion, experienced more alcohol-related problems. The authors determined that pattern of consumption was a more important predictor of problems than per capita consumption and concluded that lowering volume of consumption alone will not remedy alcohol-related problems.

Equivocal data exist on whether decreases in per capita consumption are associated with a corresponding decrease in alcohol-related problems. Garretsen et al. (1999) examined the relationship between alcohol consumption and alcohol-related harm in the Netherlands. While the population studied experienced a decrease in per capita alcohol consumption of 10% between 1980 and 1995, the prevalence of problem drinking[19] actually increased, and the number of heavy drinkers[20] increased. The number of abstainers in the population slightly increased, and social problems increased across almost every age group.

5.6. Per Capita Alcohol Consumption vs. Drinking Patterns

Rehm and colleagues quantified the global distribution of average volume of alcohol consumption and patterns of drinking in a 2003 study. The level of average consumption was estimated using data on per capita consumption as well as population surveys. Drinking patterns were measured using several indicators for heavy drinking occasions. They found that at the country level, average volume of alcohol consumption and patterns of drinking were independent. Looking at European data specifically, average volume of drinking was highest in Eastern and Western Europe. Drinking patterns, however, were least detrimental in Western and Southern Europe. The Nordic countries had comparatively high or risky scores for drinking despite lower average volume of alcohol consumption. The figures below illustrate per capita consumption figures and the scores for drinking patterns as calculated by Rehm et al. (2003a).

[19] Problem drinking defined as heavy (excessive) alcohol consumption 'which is connected with somatic psychological or social problems'

[20] Heavy drinkers defined as those who consumed 4 drinks or more at least 21 days in a month or those who consumed 6 drinks or more at least 9 days per month

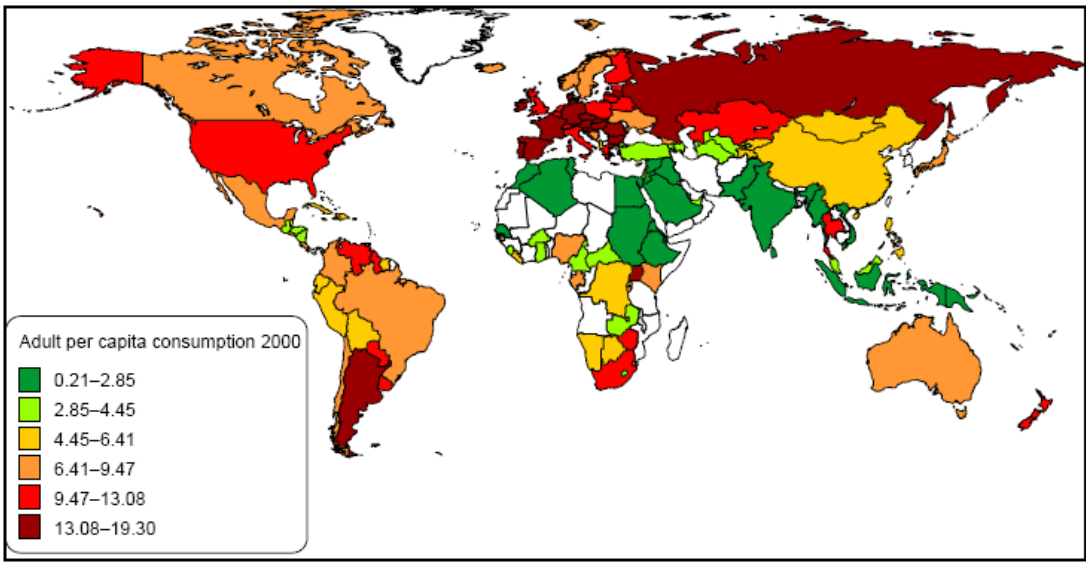

Figure 2. Adult per capita alcohol consumption in the world measured in pure alcohol per person per year (estimates include unrecorded consumption)
Source: WHO Fact Sheet EURO/10/05 (adapted from Rehm et al. 2003a)

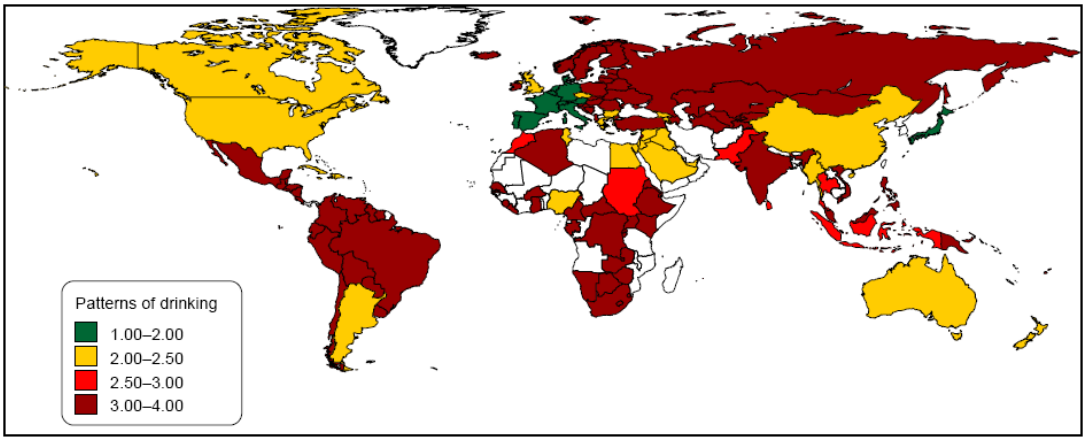

Figure 3. Differences in drinking patterns in the world, ranging from 1 (least risky) to 4 (most risky)
Source: WHO Fact Sheet EURO/10/05 (adapted from Rehm et al. 2003a)

5.7. Summary

Increasingly, researchers and organisations recognise and emphasise the importance of studying the dimensions of how individuals drink in order to better understand such risks (Bobak et al. 2004, Russell et al. 2004, San Jose et al. 2000, Rehm and Gmel 2003, SIRC 2000, ICAP 2005). It is suggested that the influence of drinking patterns on the risks and benefits associated with alcohol consumption has been underestimated, because many epidemiological studies have not attempted to examine them (Rehm et al. 2003b).

The above literature review allows one to conclude that at the country level, average volume of alcohol consumption and patterns of drinking were independent. On an individual level, total volume of consumption has been correlated with chronic health outcomes, whereas drinking patterns are related to acute health outcomes, various

social endpoints, and risk of alcohol abuse and dependence (Rehm et al. 2003b). Again at an individual level, morbidity and mortality is related to both volume of consumption and drinking patterns (WHO 2004). On a population level, high per capita consumption does not accurately predict high prevalence of heavy drinkers, rates of alcohol dependence, or various social problems (Makelä et al. 2001, Garretsen et al. 1999, Rehm et al. 2005). Additionally, decreases in overall consumption do not consistently lead to decreased alcohol-related problems (Lemmens 1995). A growing number of studies on alcohol consumption at both the individual and population level have demonstrated the importance of drinking patterns, and emphasise the need for further research on these patterns to better understand alcohol-related harm.

6. BACKGROUND REVIEW - RISKS AND BENEFITS OF ALCOHOL CONSUMPTION: THE ROLE OF MODERATE DRINKING

6.1. Introduction

The risks associated with excessive alcohol consumption are well known. Compared to non-drinkers, heavy drinkers are at increased risk of chronic diseases such as liver cancer, cirrhosis, and upper digestive cancers (e.g., Ellison 2002). In addition, heavy drinkers are more likely to die from injuries, violence, and suicide than non-drinkers (e.g., Gunzerath et al. 2004). Alcohol abuse also has negative effects on non-drinkers; for example, pregnant women who consume heavy amounts of alcohol may have babies with long-term problems such as foetal alcohol syndrome (Eidelman et al. 2002). Finally, heavy alcohol consumption is implicated in a significant portion of motor vehicle accidents in certain countries (Eidelman et al. 2002).

Despite the significant negative consequences associated with excessive alcohol consumption, researchers have long recognised that alcohol's effects are dose-related, and that the effects of low and moderate doses of alcohol are quite different from those noted above. Beneficial health and social effects of moderate consumption have been suggested for centuries. However, most of the rigorous scientific research has been conducted in the past few decades (Hines and Rimm 2001).

The relationship between moderate alcohol consumption and reduced risk of coronary heart disease (CHD) was first documented scientifically in the 1970s. This was followed by interest in what was termed the 'French Paradox,' the observation that Mediterranean populations that consumed high overall levels of red wine had low CHD despite their high intake of saturated fat (Agarwal 2002). Since that time, research into the beneficial effects of moderate alcohol consumption has been extensive. Numerous studies have demonstrated a wide range of benefits associated with moderate consumption of alcoholic beverages; the most widely accepted of these benefits is a significant reduction in the risk of heart disease.

6.2. What is Moderate Consumption?

There is no universally accepted definition of 'moderate consumption.' Examination of the literature indicates that the definition of moderate drinking varies by study, by author, by country, by gender, by age, and by beverage type. For example, the standard drink size in Europe ranges from 8 to 12 grams of alcohol, whereas it is about 14 grams in the United States (ICAP 2005). Despite these differences, there is a general consensus that moderate consumption can be recognised and that it can be distinguished from heavy drinking. A number of authors have defined moderate drinking as an average consumption of about 1 to 2 drinks per day (e.g., Goldberg et al. 1999) or up to about 30 grams alcohol per day (Agarwal 2002).

The majority of the drinking population in Europe is composed of moderate or light drinkers. Abstainers constitute from 5-38% of the population in Europe (depending on country) and, based on an analysis of fourteen countries, an average of 5% meet criteria for alcohol dependency (Rehn et al. 2001). Thus any benefits that can be

attributed to moderate alcohol consumption may be conferred to a large portion of the population.

When considering moderate drinking, the pattern of consumption is also important. There is evidence that the greatest benefits of moderate drinking occur when there is regular moderate consumption rather than sporadic episodes of heavy drinking (Sesso 2001). There is also a suggestion that drinking alcohol with a meal rather than on an empty stomach is beneficial (Rimm 2000). It must also be noted that there are some populations for whom even moderate drinking is inappropriate: individuals who are at risk of addiction or abuse; pregnant women; and people who are driving motor vehicles, operating machinery or taking certain medicines (Meister et al. 2000).

6.3. Range of Benefits Associated with Moderate Consumption

A review of the literature shows that there is a very wide range of diseases and health conditions that are beneficially modulated by moderate alcohol consumption (Goldberg et al. 1999). The U.S. National Institute on Alcohol Abuse and Alcoholism's 2004 report on moderate drinking recently concluded that moderate alcohol consumption was associated with reduced risk of all-cause mortality; heart failure and myocardial infarction; ischemic stroke; diabetes and metabolic syndrome (Gunzerath et al. 2004).

In addition to these outcomes, Meister et al. (2000) state that there is substantial epidemiologic evidence that peripheral arterial disease and gallstones are less common among moderate drinkers than among abstainers. There is limited evidence that rheumatoid arthritis, the common cold, benign prostatic hyperplasia, and kidney stones are less common among moderate drinkers than among abstainers (Meister et al. 2000). Kondo (2004) notes that moderate alcohol intake is associated with higher bone mineral density (i.e., reduced risk of osteoporosis) among postmenopausal women. Finally, there is ample science that documents the mechanisms by which moderate alcohol consumption affects metabolism and biochemistry to yield the benefits listed above (Standridge et al. 2004).

There is also evidence of psychological benefits; it is widely recognised that many people drink alcohol because it produces pleasant, relaxing effects. Alcohol reduces stress, elevates mood, and decreases anxiety (Meister et al. 2000). Moderate drinking has been associated with increased sociability, improved long-term cognitive function, better perceived subjective health, and better social integration and adjustment (Peele and Brodsky 2000). In addition, moderate drinkers have greater average earnings than either abstainers or abusers (Heien 1996), as well as lower levels of absenteeism and disability (Peele and Brodsky 2000).

The list of benefits linked to moderate alcohol consumption is long, and the strength of the evidence varies by outcome. However, the endpoint that has been studied most intensively and for which the evidence is strongest is coronary heart disease.

6.4. Moderate Alcohol Consumption and Coronary Heart Disease

Coronary heart disease is the leading cause of death in many westernised countries (Hines and Rimm 2001). The relationship between moderate alcohol consumption and coronary heart disease (CHD) was first documented scientifically in the 1970s by investigators at Kaiser Permanente in California (Hill 2005). Since that time, an abundance of observational epidemiology studies (ecological, case-control, and prospective cohort) and short-term human experimental studies have confirmed the cardioprotective effects of moderate alcohol consumption. Evidence from more than one hundred epidemiologic studies involving hundreds of thousands of subjects has led many researchers to conclude that the association is causal in nature (Goldberg et al. 1999, Hill 2005, Hines and Rimm 2001, Marmot 2001, Rimm 2000).

- **Relationship is a J-Shaped Curve**

The relationship between alcohol consumption and CHD mortality is often described as a 'J-shaped' or 'U-shaped' curve (Eidelman et al. 2002). This describes a relationship in which the highest mortality is seen among heavy drinkers; the next highest among abstainers; and the lowest among moderate drinkers (Klatsky 2002). The depth and width of the risk curve varies somewhat, depending on the underlying CHD risk of the population being studied. That is, those at highest risk of CHD derive the greatest benefit from moderate alcohol intake (Sesso 2001). An example of the J-shaped curve is presented in Figure 4 below.

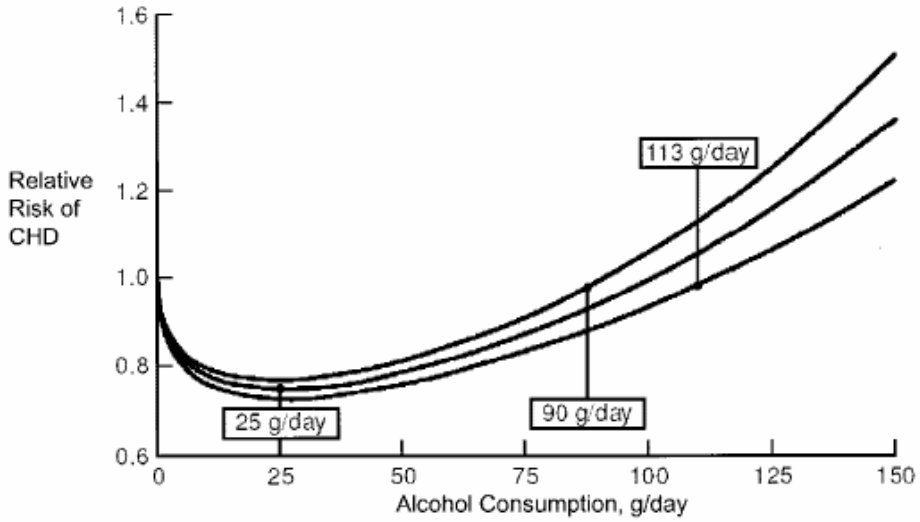

Figure 4: Function derived from meta-analysis of fifty one studies describing the dose-response relationship between alcohol consumption and the relative risk of coronary heart disease (CHD). The graph shows three different models with three critical exposure levels (nadir point, maximum dose showing statistical evidence of protective effect, and minimum dose showing statistical evidence of harmful effect).
Adapted from Corrao et al (2000).

The level of consumption that has been associated with decreased risk of CHD varies from study to study (from about 1 drink per day to about 3 drinks per day), but it appears that the greatest benefit is achieved at about one-half to one drink per day, and that the risk does not decline appreciably with increased intake (Agarwall 2002, Marmot 2001). A recent meta-analysis of fifty-one high-quality studies published between 1966 and 1998 showed that the maximum protective effect occurred at 10 grams ethanol per day (less than 1 drink) in women and 25 grams per day (about 2 drinks) in men (Corrao et al. 2000). The benefit is a substantial one: the reduction in risk of CHD associated with light to moderate drinking is estimated to be about 30 to 50% (Eidelman et al. 2002, Goldberg et al. 1999, Hines and Rimm 2001, Pownall 2002).

This J-shaped curve also emphasises the fact that high levels of alcohol consumption are associated with increased risk of heart disease. Consistent heavy alcohol consumption is known to be related to cardiomyopathy, congestive heart failure, and arrhythmias (Gunzerath et al. 2004, Klatsky 2002).

As noted previously, pattern of consumption is important. It appears that the protective effect is related more strongly to frequency of consumption than to volume; consumption of small amounts several times per week reduces risk more than the same volume consumed on few occasions (Gunzerath et al. 2004).

- **Benefits Are Robust**

The cardioprotective effect of moderate alcohol consumption is remarkably consistent. The benefit has been demonstrated in both men and women, although it is greatest among those whose age puts them at highest cardiovascular risk (i.e., men over age 45 and women over age 55) (Goldberg et al. 1999, Hines and Rimm 2001). It is seen in most industrialised nations, including those in Europe, North America, and Australia, China and Japan (Goldberg et al. 1999). The beneficial effect is observed independent of smoking status and body mass index (Gunzerath et al. 2004). The benefit has been confirmed in studies of varying designs that have adjusted for various confounding factors (Gunzerath et al. 2004, Hines and Rimm 2001). It has been observed whether the study endpoint is both fatal and nonfatal CHD (Hines and Rimm 2001). Finally, moderate alcohol consumption appears to confer CHD benefits among high-risk populations (i.e., individuals who have diabetes, hypertension, or previous myocardial infarction) (Hines and Rimm 2001).

- **Benefits Occur Regardless of Beverage Type**

Early studies suggested that red wine might be more beneficial to the heart than other types of alcoholic beverages. While there may still be some public perception that this is true, more recent scientific studies have clearly demonstrated that all types of alcoholic beverages confer cardiovascular benefits (Eidelman et al. 2002). In cultures where a particular alcohol beverage is consumed by a majority of drinkers, studies usually show that beverage as being associated with the greatest CHD benefit. For example, in Germany where beer is the most commonly consumed beverage, research

has shown protection against CHD to be especially strong among exclusive moderate drinkers of beer (Brenner et al. 2001).

Specific alcoholic beverages also contain numerous substances other than ethanol that may exert additional cardioprotective effects. For example, red and white wines contain many bioactive polyphenolic compounds, including flavonoids and antioxidants (de Lange and van de Weil 2004, Eidelman et al. 2002). Beer contains amino acids, peptides, B vitamins, as well as phenolic compounds derived from hops and malts (Kondo 2004). Research shows that homocysteine[21] levels are lower among beer drinkers than among those who drink wine or spirits. This has been attributed to the high B vitamin content of beer (van der Gaag et al. 2000, Mayer et al. 2001, Mennen et al. 2003). There is some indication that the antioxidants present in beer (including ferulic acid) may be more easily absorbed than those found in red wine (Kondo 2004).

However, it appears that the CHD benefits derive substantially from the alcohol content of the beverage, rather than any other components (Rimm 2000). A meta-analysis of cohort studies that involved more than 300,000 people followed for more than 1.8 million person-years concluded that if a particular type of alcoholic beverage afforded additional cardiovascular benefit apart from its alcoholic content, the benefit was likely to be modest at best or possibly restricted to certain subpopulations (Hill 2005).

- **Relationship is not Explained by Confounding**

Some have questioned whether there are other factors associated with alcohol consumption, rather than alcohol itself, that might account for the reduced risk of CHD. A number of possible explanations have been suggested (the non-drinkers group is contaminated by 'sick quitters'; confounding influences of dietary, lifestyle, and socioeconomic factors; factors unique to specific beverage types, etc.) Extensive efforts have been made to investigate each of these possible confounders or alternative explanations, and a number of authors have stated definitively that the primary factor in the lower rates of CHD is alcohol itself (Mukamal and Rimm 2001).

6.5. Mechanisms for Alcohol's Beneficial Effects Relative to Coronary Heart Disease

There are a number of mechanisms by which moderate alcohol consumption exerts its beneficial effects on CHD (Agarwal 2002, Eidelman et al. 2002, Hines and Rimm 2001). The most important ones are described below.

- Moderate alcohol improves the lipid profile. Alcohol increases high-density lipoprotein (HDL) cholesterol (the 'good' cholesterol) and inhibits oxidation of low-density lipoprotein (LDL) cholesterol (the 'bad' cholesterol).

[21] High homocysteine levels are reported to be a risk factor for heart attack

- Moderate alcohol reduces risk of thromboses (or clots). Alcohol reduces platelet aggregation, reduces fibrinogen levels, and increases fibrinolysis (the dissolving of clots).
- Moderate alcohol increases coronary blood flow and reduces blood pressure.
- Alcohol has beneficial effects on hormones. It reduces blood insulin, increases insulin sensitivity, and increases oestrogen levels.
- Moderate alcohol reduces stress.
- Alcohol also decreases plasma homocysteine, which is an independent risk factor for vascular diseases.

The data to support these mechanisms derive from a large body of *in vitro*, human experimental and observational epidemiology studies (Hines and Rimm 2001). Based on a meta-analysis of forty two of these human experimental studies, the effect of alcohol consumption on CHD was attributed to increases in HDL (40%-65%); fibrinogen (20%-30%); insulin sensitivity (5%-10%); and haemostatic factors (0%-5%) (Hines and Rimm 2001). The authors of the meta-analysis estimated that, on the basis of published associations between various biomarkers (e.g., HDL cholesterol) and risk of CHD, 30 grams of alcohol per day would cause an estimated reduction of 24.6% in the risk of CHD (Rimm et al. 1999).

According to Rimm (2000), the strongest argument in favour of a cause and effect association between alcohol and cardiovascular disease is the overwhelming evidence that alcohol causes cardioprotective changes in lipid and coagulation parameters that are sufficiently strong to reduce subsequent risk of coronary disease.

6.6. Summary

Excessive alcohol consumption is associated with significant negative health and social consequences, including increased risk of liver cancer, cirrhosis, and upper digestive cancers, injuries, violence, suicide, and motor vehicle accidents (Ellison 2002, Gunzerath et al. 2004, Eidelman et al. 2002). However, numerous studies have demonstrated a range of benefits associated with moderate consumption of alcoholic beverages (1-2 drinks per day), including reduced risk of all-cause mortality; heart failure and myocardial infarction; ischemic stroke; diabetes and metabolic syndrome; and a number of benefits related to psychological well-being. The most widely accepted benefit is a significant reduction in the risk of coronary heart disease.

Coronary heart disease is the leading cause of death in many westernised countries (Hines and Rimm 2001). It has been estimated that moderate alcohol consumption could save 80,000 lives per year in the United States alone. The reduction in risk of CHD associated with light to moderate drinking is estimated to be about 30 to 50% (Eidelman et al. 2002, Goldberg et al. 1999, Hines and Rimm 2001, Pownall 2002). In contrast, high levels of alcohol consumption are associated with increased risk of heart disease (Gunzerath et al. 2004, Klatsky 2002).

Numerous studies suggest that CHD benefits derive from the alcohol content of the beverage, rather than any other components (Rimm 2000); however alcoholic beverages contain numerous other substances (e.g., antioxidants, vitamins, phenolic compounds) that may exert additional cardioprotective effects (Kondo 2004, Eidelman et al. 2002).

Moderate alcohol consumption is associated with a range of health and social benefits; however potential risks are associated with any level of alcohol consumption. Decisions about consumption of alcohol are complex and require a case-by-case evaluation of an individual's particular situation, perhaps in consultation with a physician (Mukamal and Rimm 2001). Individuals who are at risk of addiction or abuse, or who have certain medical, psychiatric, or pharmacologic contraindications, should abstain from alcoholic beverages (Meister et al. 2000, Standridge et al. 2004). However, light to moderate alcohol consumption can be part of a healthy lifestyle for those who choose to consume (Hill 2005).

7. BACKGROUND REVIEW - ADVERSE SOCIAL CONSEQUENCES OF ALCOHOL CONSUMPTION

7.1. Introduction

Decades of social and behavioural research illustrate that certain patterns of alcohol consumption may contribute to a variety of social consequences, both positive and negative (Leigh 1987, Bushman 1997, Graham et al. 1998, Gmel and Gutjahr 2001, Rehm and Rossow 2001). Many studies, however, are severely limited in their understanding of the complexities that surround behaviours related to alcohol consumption (Gmel and Rehm 2003). One reason for this may be the ambiguity within the literature as to the understanding of what constitutes a 'social consequence' of alcohol consumption. For this analysis the definition of social consequences used is that provided by Klingemann and Gmel (2001): 'Social consequences of alcohol are changes, subjectively or objectively attributed or attributable to alcohol, occurring in individual social behaviour or in social interaction or in the social environment.'

Other factors also complicate understanding of the relationship between alcohol consumption and these consequences. For example there is much evidence that the relationship between alcohol consumption and social consequences are not the same in each country and across cultures (Gmel and Gutjahr 2001). In addition, one of the greatest challenges surrounding all behavioural issues, and in particular this issue, is distinguishing association from causation (Pernanen 2001a). How important is alcohol in eliciting behaviour when other important socioeconomic and psychological factors are also deeply intertwined (Klingemann and Gmel 2001)?

Moderate drinking is associated with positive social consequences related to interpersonal relationships as well as for physical and possibly mental health. A wide body of social and ethnographic research indicates that drinking is often a positive experience for individuals and social groups (Peele and Brodsky 2000, Pernanen 2001b, Peele and Grant 1999). However such positive social consequences are infrequently addressed in the literature (Peele and Brodsky 2000). This is largely because negative social consequences which result from alcohol misuse are problematic for society and are therefore studied in greater depth (Pernanen 2001b).

This section examines those adverse social consequences which have significant social impact and yet still poorly understood: aggression and violence; partner abuse; crime; and workplace productivity, absenteeism and unemployment. It does not address those areas where the harm of excessive alcohol consumption is commonly accepted, such as prenatal alcohol exposure and foetal alcohol syndrome, or the consequences of alcohol consumption and driving.

7.2. Aggression and Violence

A large body of research exists which attempts to understand the association between alcohol consumption and aggressive or violent behaviour (Lipsey et al. 1997, Rossow 2000). While some research shows that there is a positive association between the consumption of alcohol and subsequent aggressive or violent behaviour, the extent

of this association has been widely debated in the literature and there is still no wide agreement regarding the nature of the link (Pernanen 2001a, Maffli 2001). Some authors disagree with this view, however, and argue that alcohol consumption is strongly associated with aggression and violence (Wells et al. 2000).

An analysis of the research within this large body of literature examining the role of alcohol in aggression and violence shows that there is little support for causality (Lipsey et al. 1997, Gmel and Rehm 2003, Pernanen 2001a). Causality is particularly difficult to determine in the behavioural sciences and this is especially the case for the potential relationship between alcohol consumption and violence. For example, a review by Lipsey et al. (1997) came to the general conclusion there is some evidence of an association between alcohol consumption and violent behaviour, but that no firm conclusions can be drawn about whether alcohol plays a causal role. As the authors explain, 'If there were a simple and direct causal relationship between alcohol and violence, virtually everyone who drank (at least over some threshold) would become violent, a proposition refuted by everyday experience'. Gmel and Rehm (2003) also agree with this observation, adding that research that has investigated the link between alcohol and violence has not yet answered the fundamental question of whether alcohol is causally related to aggressive behaviour.

Animal studies which have assessed the relationship between alcohol consumption and violence do show demonstrable effects of both acute and chronic alcohol ingestion on aggression in some test animals. However, such effects are often not universal or consistent. In a meta-analysis of human studies by Lipsey et al. (1997), the results showed that the research paradigms used in experimental studies on the effects of alcohol consumption on aggression in human subjects are not good simulations of socially important forms of alcohol-related violence. In a comprehensive review of the research findings for alcohol consumption and aggression, Graham et al. (1996) found that there was considerable ambiguity in the findings of the research. They reported that 'one cannot conclude that drinking increases the probability of aggression in all situations.' The ambiguity of study findings was also found in experimental studies assessing alcohol-related aggression which try to separate the pharmacological effects of alcohol consumption from expectancy effects (discussed below) (Graham et al. 1996).

Other types of study, such as individual level correlation studies, also remain ambiguous as they often do not control for important variables (e.g., socio-demographics, other substance use, early exposure to violence, personality disorder). Also, levels of consumption and situational context are important and are often ignored in such studies. Unfortunately much of the literature reporting alcohol-violence correlations do not adequately or systematically examine these potentially confounding and moderating variables. As expressed by Lipsey et al. (1997), 'Despite the large volume of studies, there is little in this body of research that bears convincingly on the issue of causality in the alcohol-violence relationship'. In their review of experimental studies, Graham et al. (1996) found that alcohol consumption increases the probability of aggression only in certain situations involving provocation

or threat. In addition, Ito et al. (1996) found that situations involving high anxiety, frustration and inhibition conflict[22] increase aggressive responses.

The circumstances when alcohol consumption is associated with aggression are determined by the characteristics of the drinker and the type of drinking situation (Plant et al. 2002, Graham et al. 1996). People who become aggressive when they drink are more likely to: have a history of childhood aggression; experience poor social integration; seek approval for aggression; expect alcohol to increase aggression; be part of a subculture that associates drinking with aggression; and be heavy or problem drinkers (especially consuming high quantities per occasion) (Graham et al. 1996). In addition, experimental studies have shown that higher levels of aggression are related to higher intake of alcohol. Zhang and colleagues (1997), for example, found a significant relationship between deviant attitudes and the prevalence of violent assault in heavy drinkers, but not light drinkers.

Research has highlighted that alcohol is associated with aggression and violence in different cultures in differing ways. Throughout Europe, there are clear variations between different drinking cultures in the association of alcohol consumption and violence or aggression, and it is clear that people in different cultures behave differently when under the influence of an equal amount of alcohol (Room and Rossow 2001). A comparative analysis of alcohol sales and assault in four Nordic countries and France suggested a stronger association between alcohol and violence in Finland, Sweden and Norway, where the drinking pattern is characterised by sporadic high volume drinking events, as compared to Denmark and France, where drinking tends to be more regular (Lenke 1990). Jewkes (2002) explains how the biological links between alcohol and violence are complex, and that research on the social anthropology of alcohol drinking suggests that the connections between violence, alcohol drinking and drunkenness are socially learnt and not universal.

The 'expectation' that a drinker has when he or she consumes alcohol plays an important role in the alcohol-aggression debate. According to Gmel and Rehm (2003), specific expectations of the effects of alcohol must accompany alcohol consumption to result in aggression in a consumer. Expectations form part of the 'psychopharmacological' effect of alcohol (Bushman 1997, Graham et al. 1998) and should not be separated in attempting to understand the effects of alcohol (WHO 2004). Many studies have examined the relationship between personal characteristics (e.g., gender, cultural background, personality variables, drinking patterns) and the expectation that drinking leads to aggression. For example, some studies have found that males were more likely to expect alcohol to make them aggressive (Brown et al. 1980, Leigh 1987). Other authors have found that the expectancy theory does not have a causal effect on alcohol related aggression (Bushman 1997). Some studies have shown a clear role of cultural background in the expectations that individuals have regarding the relationship between alcohol and aggression (Teahan 1988, Lindman and Lang 1994).

[22] Inhibition conflict is a response conflict that occurs when behaviour is instigated by a set of strong cues and simultaneously inhibited by another set of strong cues

7.3. Partner Abuse

Although research shows there is little dispute over the existence of an association between excessive drinking and partner violence, there is considerable controversy surrounding the underlying reasons for this association. The nature of the association between heavy drinking and partner abuse is still unclear, and a causal effect and direction remains unproven (Maffli 2001, Leonard 2005). Partner abuse can occur with or without the presence of alcohol consumption; alcohol is never either a necessary or a sufficient condition for the occurrence of violent acts between spouses (Maffli 2001).

There is evidence to suggest that the consumption of alcohol is unlikely to predict the occurrence of a violent episode among individuals who have low hostile motivations. Instead, when a hostile motivation is already present, alcohol can act synergistically (Leonard 2005). Alcohol may only be a contributing factor in individuals in whom there are underlying causes for the action and alcohol may only serve to increase the severity of a violent episode (Leonard 2005). Leonard (2005), who takes a strong stance on the relationship between alcohol and violence, explains how in asserting that heavy drinking contributes to violence in the family, there are important caveats that should not be missed. He explains that 'alcohol's influence on intimate partner violence is not uniform. Instead it is clear that alcohol contributes to violence in some people in some circumstances.' Also controversial is whether alcohol consumption is used as an excuse that allows an individual to behave violently with less blame and punishment (Bushman 1997).

Despite the large body of research published since the 1970s, ambiguity still exits around the issue of the exact role alcohol use may play in partner abuse (Leonard 2002). According to Gmel and Rehm (2003), many studies of social consequences do not take into account the complexity of interactions among causative factors, transforming these interactions among factors into hypotheses that can be tested using appropriate statistical methodology. The authors state that 'if theory postulates that violence is a consequence of complex interactions in a defined context within a cultural setting, it is meaningless to measure only the BAC [blood alcohol concentration] of one person who has beaten another.' One of the main problems with research on partner violence is that drinking patterns and usual consumption have rarely been adequately measured, and research in this area tends to use imprecise labels of problem drinkers (Gmel and Rehm 2003).

7.4. Crime

The factors that influence criminal behaviour are complex and multifaceted. Single factors or a combination of factors have been reported to contribute to the incidence of crime, including individual, environmental, social and cultural factors (Richardson and Budd 2003). A meta-analysis of one hundred and twenty nine studies carried out by Lipsey et al. (1997) found that studies which better controlled for confounders, or other factors that might influence violence and aggression, showed lower associations between alcohol and crime.

As with alcohol and violence, most alcohol drinking does not result in crime; thus there is no single direct link between alcohol and crime. The complexity of the issue has been recognised by several authors including Martin (2001), who highlighted that 'there does not seem to be a single or simple direct pharmacological effect of alcohol that 'causes' alcohol-related crime. Rather, multiple factors at several levels of analysis are involved in a variety of combinations.'

Studies which examine incidents of crime and alcohol consumption often report high levels of intoxication in the individuals at the time of the crime. Crimes often follow a binge drinking event, but violent crime is associated with binge drinking in males only (Richardson and Budd 2003). Crime, like violence, appears to be influenced by alcohol when consumption of large amounts of alcohol is combined with a deviant or hostile predisposition.

The complexity of the issue has been underlined in a number of the more recent studies such as Martin (2001). Here the relationship between alcohol and crime varied with factors related to the characteristics of the drinker, including demographics (e.g., age, sex), the drinker's normative expectations, temperament, or personality predisposition, drug use, and general deviant attitudes. According to certain behavioural models, such as Jessor's Problem Behaviour Theory (PBT), the personality of an individual and the situation or environment all combine to play a role in deciding whether an individual will resort to problem behaviour (Jessor and Jessor 1977). Psychosocial factors such as low academic achievement, high tolerance of deviance, peer approval for delinquent behaviour and low parent-friend compatibility all correlate with problem behaviour (Martin 2001).

Research has demonstrated that situational factors play a role in the occurrence of crime as they do in the occurrence of violence. Experimental studies have found that some situational factors increase aggression and crime among persons who have been drinking, whereas other situational factors reduce propensity for violence. White's related common-cause model hypothesis that substance use and crime are not directly linked but are related because they share common causes (White et al. 1993). Both have strong correlations with childhood risk factors such as hyperactivity, impulsivity, poor parenting, and problems in the school or in the family.

Another crucial element adding to the complexity of the discussion is that alcohol consumption patterns, crime rates, and the association of alcohol consumption with aggressive or violent behaviour differs widely across different cultures as well as within subcultures. As seen with aggression and violence, any assessment of the association with alcohol in Europe must take into consideration any differences in cultures. In a study of alcohol sales and homicide rates in fourteen European countries from 1950 to 1995, Rossow (2001) found that the impact of alcohol on homicide was the highest in the three northern countries (Finland, Norway and Sweden) and lowest in four Mediterranean countries (France, Italy, Portugal and Spain). This can be taken as evidence to show that alcohol related crime and alcohol consumption *per se* are not directly linked. The relationship is better explained by the pattern of consumption. A stronger impact of alcohol on violent crimes is found in drinking cultures where acute intoxication characterises the drinking pattern (Room and Rossow 2001).

7.5. Workplace Productivity, Absenteeism and Unemployment

Workplace productivity and absenteeism constitutes social harm according to the definition of social consequences mentioned in the introduction through its societal costs and its effect on others such as co-workers and customers. It is well documented that work performance and absenteeism are affected by a wide variety of variables. Contributing factors include boredom on the job, shift work, repetitive tasks, workload, bullying, and stress. Psychiatric disorders and poor economic conditions may also influence work-related outcomes (Gmel and Rehm 2003).

Although some research has identified an association between alcohol consumption and workplace productivity/absenteeism, it is crucial to address the question of reversed causality. Put simply, it is important to know whether alcohol consumption is the cause of absenteeism and reduced productivity, or whether alcohol consumption is used as a coping mechanism to deal with the issues that cause reduced productivity and absenteeism (e.g., workplace stress, boredom). In the case of unemployment, for example, loss of work may result in increased drinking (Dooley and Prause 1998, Claussen 1999) rather than increased drinking resulting in unemployment. In a five-year follow up survey of the unemployed in Norway, Claussen (1999) found that the high prevalence of harmful drinking among Norwegian unemployed is explained mainly by unemployment causing alcohol abuse rather than vice versa and that reducing unemployment should contribute to reduced alcohol problems in Norway. Other studies have found that the link between unemployment and alcohol use remains particularly hard to determine and that reverse causality; a causal relationship coming from either direction should be considered (Ettner 1997). Gmel and Rehm (2003) also note that chains of events unaccounted for in experimental design may also cloud the picture of causality. An example of this is alcohol abuse in youth, which may lead to undesirable jobs and may result in higher absenteeism.

In general, however, research has found that moderate alcohol consumption may have a beneficial effect on productivity (Gmel and Rehm 2003), whereas alcohol dependence, alcohol abuse, and heavy drinking tend to lower productivity (Klingemann and Gmel 2001) and increase absenteeism (Rehm and Rossow 2001). Ames et al. (1997) found no significant association between absenteeism and the drinker's usual volume of consumption or frequency of heavy drinking occasions[23]. Other studies such as Blum et al. (1993) showed lower rates of absenteeism among heavy drinkers than among light drinkers. Other research has demonstrated a U-shaped curve relationship between drinking and absenteeism (Marmot et al. 1993, Vahtera et al. 2002). The U-shaped relationship demonstrates that moderate drinkers were absent from work less frequently, while heavy drinkers and those who drank very little or not at all were absent the most.

Marmot et al. (1993) also found a U-shaped relationship for men between sickness absence and both the frequency of heavy drinking occasions and the weekly quantity consumed. Workers whose frequency and quantity of consumption were moderate

[23] Frequency of heavy drinking occasions defined as the number of occasions in the past year when an individual consumed ten or more drinks

were absent less often that either abstainers or heavy drinkers. However for women, no U-shaped association was found, although abstainers had higher rates of sickness absence than moderate or heavy drinkers. Vahtera et al. (2002) also found a U-shaped relationship between alcohol consumption and absenteeism. Patterns of drinking and drinking volume were found to be important in many studies. For example, Blum et al. (1993) and Mangione et al. (1999) found that work performance was related to both the volume and the pattern of drinking.

Few researchers who have examined the whole range of alcohol consumption patterns have found a clear correlation between sickness absences and drinking. Where this is the case, particularly in all survey-based studies, careful attention has to be given to study methodology. Certain types of questioning may have caused respondents in this study to incorrectly estimate how much they drank or how much their behaviour could be attributed to their alcohol use (Gmel and Rehm 2003).

7.6. Summary

Despite extensive research examining the association between alcohol consumption and certain negative social consequences, the role that alcohol plays in different social contexts is ambiguous. Many studies that have attempted to establish a causal role of alcohol with certain behaviour have found establishing causality particularly challenging due to the complexity of the situation. In many references, such as Plant et al. (2002), a constellation of demographic, lifestyle and contextual factors are widely seen as part of the equation leading to a negative behaviour. For example, evidence in the literature coming from psychological experiments shows that expectancy regarding the effects of alcohol on mood and behaviour can have a stronger effect on behaviour than levels of blood alcohol (Brown et al. 1980, Leigh 1987). Evidence also shows that alcohol-related social harm is strongly influenced by cultural factors (Gmel and Gutjahr 2001).

Moderate drinking is associated with positive social consequences for interpersonal relationships as well as for physical and mental health. A wide body of social and ethnographic research indicates that drinking is often a positive experience for individuals and social groups (Peele and Brodsky 2000, Pernanen 2001b). Still, the vast majority of the research on the social consequences associated with alcohol consumption has focused on alcohol misuse and problem behaviours, such as binge drinking. Studies dealing with drinking behaviour show that patterns of alcohol consumption are an important determinant of social problems (Rehm and Gmel 1999). According to Rehm and Gmel (1999), drinking patterns were more related to negative social consequences than volume. Well et al. (2000) also found that alcohol intoxication rather than mere alcohol consumption, is associated with aggression. To conclude, additional research is crucial if we are to fully understand the nature of the link between alcohol consumption patterns and negative social consequences.

8. BACKGROUND REVIEW - INFLUENCES ON ADOLESCENCE DRINKING

8.1. Introduction

Moderate consumption of alcohol is seen by many researchers as part of the socialisation and integration process in adolescence[24] (Maggs and Hurrelmann 1998, Heath 1999, Engels and Knibbe 2000, Bonomo 2001). Pleasure and sociability are an integral part of the occasional consumption of alcohol (Choquet 2004), and many of the positive effects which adolescents feel when drinking alcohol are well documented (Hibell et al. 2000). Throughout Europe, young people are often exposed to alcohol, or to its effects on those around them, in family situations as part of celebrations or special events. According to Settertobulte et al. (2001), 'alcohol is an integral part of adult's conviviality and bonding in all countries and cultures. This cultural model is imitated by adolescents in their groups'.

Issues with adolescent drinking arise, however, when controlled and moderate drinking patterns turn into problem behaviour—that is, when occasional use for social events turns into misuse, often characterised in the literature by premature/underage drinking, consistent drinking and binge drinking[25]. This misuse of alcohol in adolescents is associated with risky behaviours that may lead to such consequences as sexually transmitted diseases, unwanted pregnancy, disability, injury or even death (Bonomo 2001, Rehm et al. 2001).

Characterising alcohol misuse by adolescents throughout Europe presents challenges, as different cultures and countries have different societal and legal standards for alcohol consumption. For example, the differing age limit for alcohol purchasing or consumption may result in differential recording of alcohol misuse as it applies to under-age drinking. Also, studies which have inconsistent findings for binge drinking may be due to differences in measurements and definitions of binge drinking (Bloomfield et al. 2003).

In order to successfully limit premature and excessive drinking among adolescents, it is necessary to understand the etiology of drinking behaviour (Kuntsche et al. 2004). An important aspect of this is to understand the influences on young people which play a large role in alcohol consumption among young people. A vast body of literature ranging over the last thirty years has analysed these influences and illustrates that there are a multitude of factors that may lead adolescents to drink. The relative role of each of these factors remains unclear, but many studies demonstrate that it is often the interplay between these factors that is the real driving force in motivating adolescents to drink (Settertobulte et al. 2001, Kuntsche et al. 2004, Choquet 2004).

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[24] Adolescents in this section are defined using the WHO definition of youths between the ages of 10-19 years (adopted at the South Asia conference on adolescents in 1998). This definition does not distinguish between different age groups (i.e., 11-13 year olds, 15-18 yr olds) in which alcohol consumption patterns may differ widely. Most of the sources used provided no definition for adolescents and so the WHO definition was therefore used to define the section

[25] Binge drinking in this section is defined using the definitions of Gmel et al. (2003) as a drinking occasion leading to intoxication, often measured as consuming more than a specified number of drinks on one occasion; the number of drinks varies between studies

This section will examine the most significant and well documented influences that affect adolescent alcohol consumption and in particular adolescent problem drinking behaviour, such as binge drinking. The section will therefore not deal with any description of the biomedical or physiological aspects of youth drinking, nor will it deal with any biological consequences that may result from this behaviour. The influences discussed are: cultural and social, including social position and financial resources; schooling; parental; peer group; advertising; and individual factors.

8.2. Cultural and Social Factors

- **Parental Influence**

Parental and familial influences are seen as particularly important when it comes to adolescent drinking. In many cases, the introduction of alcohol to children occurs in the family, at family events such as birthdays, marriages and anniversaries. The continuation of alcohol consumption is also dependent on many factors, both risk factors and those with a protective effect (Settertobulte et al. 2001). Studies which have looked at the influence of the family have mainly looked at genetic factors, parent's behaviour models, and style of upbringing and communication patterns in the family. These studies have found that, in general, all of these factors play an important role in childhood behaviour and in affinity toward alcohol in adolescence.

Genetic Factors

Some studies have found that the affinity of adolescents to consume alcohol or use drugs, as well as an individual's risk of dependency on those substances, are co-determined, to some degree, by the genetic make-up of the individual (Settertobulte et al. 2001). Kuntsche et al. (2004) also report that discrepancies in the literature as to whether family history of alcohol abuse plays a role in binge drinking may be related to whether or not genetic influence is included in the studies. Maes et al. (1999) showed that alcohol abuse and addiction are co-determined to a significant degree by genetic factors. Schuckit and Smith (1996) also found a genetically determined low response to the acute effects of alcohol intake among children of alcoholics. According to Kuntsche et al. (2004), the interplay between genetic and environmental factors is important for the onset of binge drinking in adolescents. In a Finnish study on adolescent twins, genetic effects were shown to be important in predicting the development of binge drinking (Viken et al. 1999). Indeed, any studies which examine the role of familial influences on the initiation and continuation of problem drinking behaviours in adolescents need to distinguish between genetic and environmental influences or look at the two in combination as possible triggers for the problem behaviour (Kuntsche et al. 2004).

Parental Alcohol Consumption

Studies have found that the intensity and the frequency of alcohol consumption by parents themselves is a decisive co-determinant of youth and adolescent alcohol consumption (Kuntsche et al. 2004). This may be because alcoholic beverages are more freely available in households where parents drink more frequently, or because since alcohol is consumed more frequently, children have more opportunities to try alcohol. Parental education may also play a role in determining drinking in certain youths. According to Settertobulte et al. (2001), parents provide the first models of alcohol consumption in the family context.

Many aspects of the family situation may influence youth drinking. For example, Dielmann et al. (1993) found that when older siblings consume alcohol more frequently, the likelihood of alcohol consumption in younger siblings increases. In a very recent study by Alati et al. (2005), a range of biological, familial and interpersonal factors were considered to explore the early predictors of problem drinking in youth. A series of regression models were used to explore pathways to problem drinking from adolescence to early adulthood. The results showed that exposure to maternal drinking in adolescence is a strong risk factor for the development of alcohol problems in early adulthood. In the study, teenage children of mothers who drank one or more drinks a day had a two-fold risk of problem drinking in young adulthood.

The relationship that children have with their parents is also important (Duncan et al. 1995, Foxcroft and Lowe 1995). In particular, an excessively permissive style of upbringing increases the likelihood of alcohol misuse in children. Conversely, where adolescents have a self-reported open and respectful relationship with their parents, alcohol consumption by adolescents is lower than in families where relationships are negative or disrupted. When conflicts in family communication are dealt with in a constructive way, children learn social skills and conflict management competence that they can later use in tackling their own problems. This is seen as useful in avoiding peer pressure and avoiding destructive solutions to problems (Settertobulte et al. 2001).

- **Peer Group Influence**

Research shows that peer influence is one of the strongest factors for predicting binge drinking in Europe (Kuntsche et al. 2004). This is an issue that has been well studied in adolescents over the past thirty years, and much of the research demonstrates a strong association between substance using peers and individual's substance use (Kandel 1980, Jones and Heaven 1998). According to Kuntsche et al. (2004) in their review of the European literature on binge drinking, pressure from peers was one of the strongest influencing factors for binge drinking and seemed to outweigh parental influences, especially from late adolescence onwards.

Peers can influence directly through offering drinks or buying them, or indirectly through modelling and behaviour. This so-called 'social modelling' has been a strong predictor of expectancies in drinking. Many studies which look at the influences of

the peer group on drinking have come from the United States; however there are some European studies which show that male binge drinkers have a higher number of peer relationships (Laukkanen et al. 2001) and that having peers who drink alcoholic beverages was significantly associated with the development of problematic alcohol consumption[26] (Ariza Cardenal et al. 2000). In a multivariate study in Germany, other than amount of alcohol consumed, peer group substance use, including alcohol, was the most significant predictor of alcohol problems (Barnow et al. 2002). In a longitudinal Norwegian study (Wichstrøm 1998), an adolescent's friends' alcohol consumption and problem behaviour influenced that individual to seek alcohol intoxication.

- **Schooling Influences**

Several studies show a clear relationship between alcohol consumption and poor academic performance (Hawkins et al. 1992, Nordlohne 1992) with alcohol consumption seen as both the result and cause of school failure. The school itself is seen by many as a great influence on the behaviour of children, simply because so much time is spent there. In terms of problem behaviour, the WHO HBSC school study found that frequent alcohol drinking is associated with dislike of school while reduced alcohol consumption is associated with factors such as positive student-teacher relationships (Settertobulte et al. 2001). Several other studies have shown an association between the level of binge drinking and poor school academic achievement and dropping out of school (Laukkanen et al. 2001, Muthen and Muthen 2000, Wichstrøm 1998, Wechsler et al. 1994).

- **Cultural Context**

The cultural context is an important element in determining youth and adolescent drinking in Europe, and many comparative studies have strengthened the importance of cultural differences in problem drinking behaviours such as binge drinking (Currie et al. 2000, Hibell et al. 2004). According to surveys such as the 2003 European School Survey Project on Alcohol and Drugs (ESPAD), underage drinking is more prevalent in so called 'dry' countries, where alcohol consumption is perceived with ambivalence, than in 'wet' countries, where it is integrated into daily life (Choquet 2004).[27] Many studies also find more binge drinking in northern countries than in southern countries (Hemström et al. 2002, Rehm et al. 2003b, Hibell et al. 2004). This north-south gradient was documented in 15 year-olds in the 1998 World Health Organization (WHO) Health Behaviour in School Children (HBSC) study and also in the 2003 ESPAD study. Inconsistent findings for binge drinking in some studies may be due to differences in measurements and definitions of binge drinking (Bloomfield et al. 2003) and this should be taken into account when making any conclusions about the differences reported throughout Europe.

[26] Problematic alcohol consumption was measured using five variables: to have been intoxicated one or more times in the last six months; to have consumed four or more glasses of alcoholic beverage in a row at least once (binge-drinking); to have consumed beverages of a high alcohol content (more than 20%); to drink daily; and to buy alcohol with their own money

[27] The target population of the ESPAD study was students that were or would become 16 years old during the year of data collection

In addition to the overall cultural differences in alcohol consumption between European countries, specific adult and adolescent drinking cultures have been shown to have their own individual effects on alcohol consumption (Bjarnason et al. 2003). Some studies conclude that binge drinking is less likely in countries in which alcohol is integrated into everyday life compared to countries where sporadic heavy drinking episodes have greater cultural acceptance (Kuntsche et al. 2004). According to Choquet (2004), the adolescents at most risk with regard to alcohol do not come from those countries where total consumption of alcoholic beverages is the highest. For example, adolescents in France and Portugal, the countries where alcohol consumption is the highest in Europe, tend to display moderate consumption. On the other hand, adolescents in Denmark, Ireland and the United Kingdom, countries that do not lead Europe in terms of overall consumption, tend to display high levels of alcohol consumption.

- **Social Position and Financial Resources**

In many of the literature studies on adults, alcohol consumption and its misuse are frequently seen in connection with social position in Europe (Settertobulte et al. 2001). However, in the HBSC study, a large scale international study carried out in an attempt to collect comparable data on alcohol consumption among young people, the results were varied. No clear differences were seen in Greece, Austria, the Czech Republic, Germany and Portugal; however in the United Kingdom (with the exception of Northern Ireland) as well as in Denmark, Belgium and the Russian Federation, France, Hungary, Latvia, Poland and Estonia, adolescents from families with higher income consumed alcohol more frequently. On the other hand, in Northern Ireland and the Republic of Ireland, as well as in Slovakia, Canada, Israel and the United States, it was mainly adolescents from financially disadvantaged families who drank the most. The reasons for the differences between countries are difficult to interpret. Alcohol consumption in adolescents is not a necessary consequence of social inequity, but rather a more complex social problem (Settertobulte et al. 2001).

In adults, the level of available financial resources is a strong predictor of problem drinking patterns such as binge drinking; lower income earners demonstrate more binge drinking (Kuntsche et al. 2004). In adolescents, however, the availability of financial resources appears to be related to binge drinking in different ways in the north and south of Europe. In a Finnish study, for example, drunkenness was more common among 14-year olds who received more pocket money (Lintonen et al. 2000). However in a longitudinal study in Spain, the amount of money adolescents had available to them failed to correlate with the progression from moderate to problematic alcohol consumption[28] (Ariza Cardenal and Nebot Adell 2000). Kuntsche et al. (2004) speculate that the reasons for this association lies in easier access to, and lower prices for, alcoholic beverages in Southern European countries as compared to Northern European countries. In a comparative econometric analysis of fourteen European countries, Spain had the lowest price index for alcohol, whereas Finland had the highest (Leppänen et al. 2001).

[28] Problematic alcohol consumption was defined using the following variables: to have been drunk one or more times in the last six months; to have drunk four or more glasses in a row at least once (binge-drinking); to have consumed some beverages of high alcohol content (more than 20%); to drink daily; and to buy alcohol with their own money

There is wide consensus that socioeconomic status and level of parental education have a weak influence on their children's level of alcohol consumption (Lewinsohn et al. 1996, Schucksmith et al. 1997, Casswell et al. 1991, Duncan et al. 1994); however, recent research has demonstrated excessive alcohol consumption is more common in socially privileged families in Belgium as compared to those of lower socioeconomic status (Leveque et al. 2002).

- **Advertising**

Even after thirty years of research, the influence of alcohol advertising on adolescents is still a matter of intense debate (Hastings et al. 2005) with inconsistencies reported throughout the literature (Martin et al. 2002, Grube and Waiters 2005). Research into the influence of alcohol advertising on consumption has been divided into two types in the literature: econometric studies, which involve a statistical examination of the relationship between overall levels of alcohol consumption and overall levels of advertising normally using economic data as the basis; and consumer studies, which analyse the change of people's drinking knowledge, attitudes and behaviour with their exposure to alcohol advertising.

The majority of the econometric studies suggest that alcohol advertising has minimal or no effect on total alcohol consumption. The findings from consumer studies have been less clear, but some do suggest a modest association between advertising and young people's drinking (Hastings et al. 2005). However, a recent psychometric analysis on 1,000 youths aged 12-17 explored a number of possible influences on drinking behaviour, including influence of home, peers, achievement orientation, risk perception, as well as knowledge and attitudes related to alcohol advertising. The authors concluded that alcohol advertising did not influence drinking behaviour. Instead, the decision to drink alcohol was related to the hypothetical construct referred to as "alcohol balance", or the balance between pleasure-seeking behaviour, achievement orientation and parental influence (Bergler et al. 2000).

According to Grube and Waiters (2005), survey research studies provide some evidence that alcohol advertising may influence drinking beliefs and behaviours among adolescents. There is a growing body of research seeking to extend these findings. However, the evidence is still far from conclusive.

The issue of causality and whether drinking encourages attention to advertising or advertising encourages a desire to drink is extremely important (Martin et al. 2002). Causality is hard to determine from many of the published survey results and there is a need for longitudinal studies which follow samples of young people from childhood to late adolescence to adequately control for past drinking behaviours and predisposing factors (Grube and Waiters 2005). In a longitudinal study in the United States, Ellickson et al. (2005) found that several forms of alcohol advertising predict adolescent drinking. However the sources of this advertising depended on the child's prior experience with alcohol.

The mechanisms through which advertising may influence young people are poorly understood (Martin et al. 2002). However, since it is understood that young people have well developed beliefs about alcohol and its effects and its consequences, even before they have had any direct drinking experiences, and it is these beliefs about alcohol which may affect future alcohol consumption, some researchers recommend that advertising should be considered as another potential source through which young people can learn about the effects of alcohol (Martin et al. 2002).

8.3. Individual Factors

- **Personality**

Evidence suggests that impulsivity and sensation seeking are risk factors for heavy drinking in adolescents (Ichiyama and Kruse 1998). Many studies have also showed that emotional pain, loneliness, depression, anxiety, stress and tension have all been related to binge drinking (Laukkanen et al. 2001, Poikolainen et al. 2001) and that the interplay between these factors is extremely complex. Often the ability or inability to cope with these problems was a more important predictor of binge drinking than the problem itself (Tyssen et al. 1998). In adolescence, personality-related factors are clearly linked to binge drinking (Kuntsche et al. 2004). According to the literature, adolescents who drink alcohol tend to display more problem behaviours than those who do not drink alcohol, especially in school behaviour and violent behaviour (Choquet 2004). In a literature review of the subject, White (1997) found that aggressive behaviour is more predictive of alcohol consumption in adolescents than vice versa. Taken together, these studies suggest that the personality and character of an individual influence problem drinking behaviour.

- **Motivational Aspects**

In the literature ‘drinking motives’ and ‘reasons for drinking’ are used interchangeably; however there are subtle differences between the two expressions. In the discipline of psychology, ‘reason’ is defined as an intellectual process involved in considering the totality of a situation or an explanation for a behaviour (Corsini 2002). ‘Motives’ are more broadly defined as conscious or unconscious reasons for a behaviour that directs a person’s energies toward a goal (Cox and Klinger 1988, Kuntsche et al. 2005).

The literature illustrates that most adolescents drink for social reasons or to enhance the sense of enjoyment (Kuntsche et al. 2005). Other adolescents drink as a coping mechanism. Social motives appear to be associated with moderate alcohol consumption, while enhancement is associated with heavy drinking, and coping mechanisms are associated with alcohol-related problems. Some researchers claim that psychological variables such as expectancies and reasons are better predictors of problem drinking behaviour than demographic variables (Kuntsche et al. 2004). In adolescents, expectancies differ in different age groups and also for different genders. In a Dutch study (Wiers et al. 1997), the expectancy of sexual enhancement in early adolescence (the improvement or enrichment of sexual relationships) predicted alcohol consumption in boys only. However, later in adolescence, in the same study,

the expectancy of sexual enhancement was the best predictor for alcohol consumption in girls.

- **Associated Problem Behaviours**

Research shows that there is a strong correlation between the consumption of alcohol, tobacco and cannabis in adolescents. However gender-related differences exist (Choquet et al. 2001). What is clear is that the nature of this link is poorly understood and there is much speculation as to whether this relationship is causal as suggested by the 'gateway theory' (Choquet 2004). The 'gateway theory' proposes that once young people start drinking alcoholic beverages or using tobacco, they are more likely to progress to marijuana and finally to hard drugs than those who did not consume alcohol or use tobacco (Kandel 1975). However, more recent studies on the topic have not substantiated this theory. In particular, Wills et al. (1996) identified a high-risk group in which rapid substance use was prominent, but other factors were involved, such as greater life stress, lower parental support, parental substance use and greater deviant attitudes. The authors claim that it is the interplay of these factors that leads to hard drug use rather than the effect of early alcohol consumption. For European countries, the evidence that early onset of binge drinking is related to alcohol problems later in life is also weak (Kuntsche et al. 2004).

8.4. Summary

The causes and reasons for adolescent alcohol consumption and abuse are likely found in the interplay of various genetic, environmental, psychological, social and lifestyle factors (Settertobulte et al. 2001). Many researchers have highlighted the need to understand this interplay of factors affecting the influences and motivations for drinking in adolescents. Family factors, the role of peers, stress and the development process of individualisation are reported to be predictive of adolescent alcohol use (Baer and Bray 1999).

Understanding the exact role of each of the factors and influences on adolescent drinking is complicated by the sheer number of variables which interact. However, some studies do provide insight into the relative weight of the influencing factors. Large reviews conclude that pressure from peers is one of the strongest influencing factors for binge drinking and seemed to outweigh parental influences. Interactions between personality traits and environmental influences may be helpful in determining risks of binge drinking (Kuntsche et al. 2004). It is also clear from the literature that different factors have influence at different stages of adolescence, and the interplay of these factors has been reported to vary significantly between cultures (Choquet 2004).

Despite over thirty years of research in this area, there is still no consensus regarding the relative role of each of the factors associated with adolescent alcohol consumption and the interaction of any or all of these factors with individual characteristics. Many researchers echo the need for additional research in the form of longitudinal studies that will provide valuable information about which factors influence adolescents to drink alcoholic beverages.

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ANNEX I - STATEMENT OF ASSIGNMENT

The Brewers of Europe

5406DIV

Brussels, 3rd May 2006

Dr. Myron Weinberg The Weinberg Group European Headquarters 360 Boulevard du Souverain B - 1160 Brussels

Dear Dr. Weinberg,

Ahead of the expert panel meeting on May 9, 2006, I am writing to you, further to our discussions, to record the basis on which THE WEINBERG GROUP should proceed. You are well aware that Europe's brewers are concerned about any harm caused by the inappropriate drinking of their products. Being completely aligned with the overall aim of reducing alcohol misuse, The Brewers of Europe recognises that the most effective means of achieving this objective must be an evidence-based approach.

In this context and in order to make the best possible input to the process of developing EU policy, The Brewers of Europe has asked THE WEINBERG GROUP to assist our sector in gaining a better understanding of those areas for which there appear to be conflicting views or ambiguity in the scientific literature. In order to do this, it has been agreed that, with you as rapporteur, a panel of independent experts will be convened to provide advice to The Brewers of Europe in the following areas of interest:

European Cultural Differences and Alcohol Consumption;
Total Consumption of Alcohol and Drinking Patterns: Implications for Harm;
Risks and Benefits of Alcohol Consumption: The Role of Moderate Drinking;
Adverse Social Consequences of Alcohol Consumption; and
Influences on Adolescence Drinking.

We understand that, in preparation for this panel meeting, background material on each area will be prepared and submitted to the panel as a basis for their review. These experts will be asked to examine this material to ensure that it is a fair, accurate and up-to-date representation of the state of the science. These experts will then be asked to comment on the outcome of the review in terms of its potential implications for policy development in Europe.

We agree that, to insure its independence, the panel meeting notes will be written up, and will include key conclusions signed off by panel members. It is also agreed that, if there are any dissenting views,

these will be recorded in the report. Upon completion of the meeting report, a final package will be forwarded to The Brewers of Europe for use as a basis for our input into the EU policy making process.

We understand that the final package will contain the background material with all references, the report on the panel meeting with key conclusions and a description of the entire process carried out by THE WEINBERG GROUP.

We are looking forward to the output of this process and wish the panel well in its deliberations.

Yours faithfully,

Rodolphe de Looz-Corswarem Secretary General

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The Brewers of Europe

ANNEX II - EXPERT PANEL DETAILED PROFILES

CURRICULUM VITAE

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EDUCATION AND TRAINING

1962 B.A.	Economics. City University of New York, The City College
1964 M.A.	Sociology. Yale University, New Haven, Connecticut
1966 Ph.D.	Sociology. Yale University, New Haven, Connecticut

PROFESSIONAL EXPERIENCE

09/79 - present	Professor, The Johns Hopkins University, School of Hygiene and Public Health: Department of Health Policy and Management (*). Division of Behavioral and Social Sciences and Faculty of Arts and Sciences: Department of Sociology (1972-1986)
06/96 - present	Professor of Epidemiology, Berlin University of Technology, Institute for Health Sciences
04/05 – present	Professor and Chairman, Social and Behavioral Sciences, School of Public Health, UNT Health Science Center
10/01 - 07/03	Visiting Professor, Yale University

	School of Medicine: Dept. of Epidemiology and Public Health
07/01/72 - 09/79	Associate Professor, The Johns Hopkins University, School of Hygiene and Public Health: Operations Research in the Department of Public Health Administration; Department of Behavioral Sciences; Department of Mental Hygiene. Faculty of Arts and Sciences: Department of Social Relations; and Director of Research, Center for Metropolitan Planning and Research
01/01/77 - 07/01/77	Visiting Professor, Harvard University, School of Public Health, and Department of Sociology
01/01/72 - 06/30/72	Associate Professor, Epidemiology and Public Health, and Sociology, Yale Medical School and Yale University, Faculty of Arts & Sciences
09/01/66 - 12/30/71	Assistant Professor, Epidemiology and Public Health, and Sociology, Yale Medical School and Yale University, Faculty of Arts & Sciences
1965 - 1966	Associate in Research, Epidemiology and Public Health and Sociology, Yale Medical School and Yale University Department of Sociology
1963 - 1964	Research Staff, Wakoff Research Center, Staten Island Mental Health Society

OTHER PROFESSIONAL EXPERIENCE

09/77 - 1982	Program Coordinator for Health Policy Studies, Center for Metropolitan Planning and Research, The Johns Hopkins University
07/01/73 - 01/01/82	Director of Research, Center for Metropolitan Planning and Research, The Johns Hopkins University

PROFESSIONAL ACTIVITIES

Society Membership

American Public Health Association
American Sociological Association
American Association for the Advancement of Science

Consultations

United Nations Social Defense Research Institute
World Health Organization, Office of Mental Health, Geneva, Switzerland
World Health Organization, European Region, Copenhagen, Denmark
Office of Policy Development and Planning, Assistant Secretary of Health, HHS
National Institute of Alcohol Abuse and Alcoholism (Contractor)
National Institute of Mental Health (Contractor)
Congressional Research Service, Library of Congress
Joint Economic Committee, United States Congress
Committee on the Judiciary, United States House of Representatives

HONORS AND AWARDS

Phi Beta Kappa 1962

American Public Health Association "Career Award for Scientific Excellence 1997"

PUBLICATIONS

Books and Monographs

Brenner, M.H. Time-Series Analysis of the Relationship Between Selected Economic and Social Indicators. Department of Labor Manpower Administration, U.S. Government Printing Office, 1 vols. 1971.

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Meinlschmidt, G., Brenner M.H. Atlas of Social Structures for Berlin 1999, Publication Series of the Berlin Centre Public Health, Senate of Berlin for Health and Social Affairs, 2000

Brenner, M.H., Cateriano, A. ″Estimating the Social Cost of Employment Policies in the United Kingdom: An Error Correction Model", Publication Series of the Berlin Centre Public Health, March 2000

Sinha, M., Brenner, M.H. et al. ″Evaluation of Managed Care Oriented Services in Public Health", Publication Series of the Berlin Centre Public Health, 2000-06, July 2000

Edenharter, G., Friedrich, D., Brenner, M.H. “United Kingdom: Exploratory Analysis of the Mortality-Unemployment Relationship with Poisson Distributed Lags”, Publication Series of the Berlin Centre Public Health, 2000-08, August 2000

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Brenner, M.H., Commentary: Economic growth is the basis of mortality rate decline in the 20th Century – Experience of the United States 1901-2000. International Journal of Epidemiology, July 2005.

Brenner, M.H., " Health Benefits of Low-Cost Energy An Econometric Case Study, EM Magazine, Air & Waste Management Association, in press

WORK IN PROGRESS

Books

Brenner, M. H. , Life, Death and the Economy. Oxford University Press (to be submitted July 2006)

Articles in progress

Brenner, M.H., "Survival and macroeconomic change in the largest industrial economies (United States, Japan and West Germany)", to be submitted to Science

Brenner, M.H., "Rapid economic change and mortality in European Union countries and the United States". to be submitted to the Lancet

Brenner, M.H. and A. Curry, "Health care expenditures and mortality in the United States", to be submitted to the New England Journal of Medicine

Brenner, M.H., "Suicide and the national economy in international perspective", to be submitted to the American Journal of Psychiatry.

Brenner, M.H., "Economic change and homicide in industrialized societies", to be submitted to the American Sociological Review.

Brenner, M.H., "Impact of income growth, unemployment and economic inequality on health in U.S. States", to be submitted to American Journal of Public Health.

Brenner, M.H., "The 1990s Russian mortality epidemic and the impact of economic transition", to be submitted to the Lancet or Demography.

Brenner, M.H., "Social welfare policy and national wealth: the foundations of mortality differentials among industrial societies", to be submitted to Social Science and Medicine.

Brenner, M.H., R. Farkov and E. Andreeva, “Health care expenditures and economic productivity in industrialized countries”, to be submitted to the Lancet or British Medical Journal.

Brenner, M.H., “Economic change and Mortality in New York City and Berlin: 1950-2000” (paper presented at the New York Academy of Medicine meetings 2003), to be submitted to the American Journal of Public Health.

Brenner, M.H., “Mortality and the Social Areas of New York City”, to be submitted to the American Journal of Public Health.

(*) Senior staff who are also listed as full professors at another university – i.e., had joint appointments – were considered under a recent change in Hopkins’ legal terminology as “emeritus” to convey that they were not occupying two full time positions. They continued however to be entitled to earn identical salaries, submit grants, teach courses at Hopkins.

CHOQUET Marie

November 1, 1944 (Belgium)
Social psychologist and epidemiologist
University of Louvain, Belgium (MA, BA, Ph.D)
Research Director at the National Institute of Health and Medical Research (INSERM, France U 669)
Involved in research on adolescent mental health (psychotropic substance use, suicidal behaviour, eating disorders, violent behaviour, delinquency, depressive mood)
Vice president of the scientific committee of IREB (Institut des Recherches et Etudes sur les Boissons)
Member of the scientific committee of OFDT (Observatoire Français des Drogues et des Toxicomanies), INPES (Institut National de la Prévention et de l'Education à la Santé)

SELECTED PUBLICATIONS

International Journals

KNIBBE R., JOOSTEN J., DERICKX M., CHOQUET M., MORIN D., MONSHOUWER K., VOLLEBERGH W. Perceived availability of substances, substance use and sustance-related problems: a cross national study among French and Dutch adolescnts. Journal of substance abuse, 10. 151-163 (2005)

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National and international Service Committees

* Unesco, 1988-1994
* Council of Europe, 1988-1991
* Fondation de France, scientific committee member, 1995 - 2001
* Institut de Recherche et Etudes sur les Boissons (IREB, scientific committee member), 1994 -present
* Société Française d'Alcoologie (vice-president), 1990 - 1999
* Institut National de Recherche Pedagogique (scientific committee member), 1998 – 2006
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SMi, London, UK, 23 February 2005

Terrorism and the Politics of Fear
Perse School
Cambridge, UK, 11 February 2005

International Terrorism
Surrey Emergency Services Major Incidents Committee
Kempton Park Racecourse, Surrey, UK, 9 February 2005

The Limitations of Risk Management in Dealing with Disaster
Social Contexts and Responses to Risk Conference
University of Kent, Canterbury, UK, 29 January 2005

The Domestic Management of Terrorist Attacks
Anti-Terrorism, Media and Publics
Regents College, London, UK, 14 January 2005

2004

Resilient or Vulnerable? The Consequences for UK Security of Assumptions about Human Behaviour in a Disaster
British International Studies Association Conference
University of Warwick, UK, 20 December 2004

Chemical Reactions
Royal Institution of Great Britain
Piccadilly, London, 23 November 2004

Is Real Resilience Attainable?
Wide Area Crises – Resilience and Recovery in the 21st Century
SMi, London, UK, 15 November 2004

Facing the Possibility of Bioterrorism
VIIth International CBRN Defence Symposium
Defence Academy of the United Kingdom, Shrivenham, 12 November 2004

Animal-Rights Terrorism and the Demise of Political Debate
Annual General Meeting
Coalition for Medical Progress, Wellcome Trust, 6 October 2004

Nanotechnology and Risk Assessment
Labour Party Conference Fringe Meeting
King's Hotel, Brighton, 28 September 2004

Risk Assessment and UK Policy
Science and Society in the Face of the New Security Threats
NATO Advanced Research Workshop, University of Cambridge, 27 September 2004

What can the Science and Technology Community Contribute?
Science and Technology Policies for the Anti-Terrorism Era
NATO Advanced Research Workshop, University of Manchester, 13 September 2004

The Domestic Context of the War Against Terror
International Intelligence Directors Course
Defence Intelligence and Security Centre, Chicksands, Bedfordshire, 5 July 2004

Fear and Self-Loathing in the West
Ideologies of Anti-Americanism: Cross-cultural Perspectives
Department of Politics and International Relations, Oxford, 12 June 2004

Prioritising Chemicals for Attention: Risk versus Hazard
REACH: A Science Based Approach
Scientific Alliance, London, 3 June 2004

Transport/Commuter Security – Two Months on from Madrid
Homeland Security and Resilience
Royal United Services Institute for Defence Studies, London, 19 May 2004

Terror in an Age of Insecurity
The Age of Insecurity
The Institute for Cultural Research, London, 15 May 2004

Government and Media Influences
Perception Gap: Public attitudes to security and the impact on corporate decision-making
Demos, London, 11 May 2004

The Costs of Precautionary Chemicals Regulation
Science and Politics – Special Symposium
Society of Environmental Toxicology and Chemistry, Prague, 19 April 2004

How Accountable should Scientists be to the Public?
Oxford Literary Festival
Town Hall, Oxford, 27 March 2004

The Precautionary Principle: Is it Killing Innovation?
An Apology for Capitalism?
Economist Conference, Whitehall, London, 20 February 2004

Who's Afraid of the Modern World?
The Way We Live Now
Fabian Society Conference, Imperial College, London, 7 February 2004

2003

General Trends
Therapy Culture: Cultivating Vulnerability in an Uncertain Age
King's College London, 22 November 2003

Plenary Session
Countering Terrorism: The Experience of the Kingdom of Saudi Arabia
Royal United Services Institute for Defence Studies, London, 22 October 2003

The Cultural Background to Risk Aversion and its Consequences for Resilience
Global Security and Resilience Symposium
Defence Academy of the United Kingdom, Shrivenham, 9 October 2003

Chemical and Biological Weapons
Global Public Affairs Conference
Dorchester Hotel, London, 3 October 2003

9/11 – Two Years On
Liberal Democrat Party Conference Fringe Meeting
Hilton Metropole Hotel, Brighton, 21 September 2003

Emergent Concepts of Risk
Risk in its Social Context
University of Plymouth, 9 September 2003

Political Stability: Impacts on Global Business
Institute for Practitioners in Credit Insurance and Surety
University of East London, 18 August 2003

European Chemicals Policy
World Congress on Risk
Brussels, Belgium, 24 June 2003

The Challenge of Terrorism
World Congress on Risk
Brussels, Belgium, 23 June 2003

Peer Review and Public Experts
Ideas, Intellectuals and the Public
Goodenough College, London, 22 June 2003

Chemical and Biological Weapons
Festival of Science
Cheltenham, England, 8 June 2003

Closing Remarks
Communicating the War on Terror
Royal Institution of Great Britain, Piccadilly, London, 6 June 2003

Public Dialogue in Science
Parliamentary Office for Science and Technology
Portcullis House, Westminster, London, 13 May 2003

Risk and Chemicals
Stockholm Network Conference
Geneva, Switzerland, 7 May 2003

Cultural and Psychological Aspects of the War on Terror
Psychological Aspects of Terrorism and Martyrdom
University of Ulster, Derry, 30 April 2003

Bio-Terrorism
Genes and Society Conference
Battersea Arts Centre, London, 26 April 2003

Genetically Modified Crops: Time to Say Yes?
Genes and Society Conference
Battersea Arts Centre, London, 25 April 2003

The Challenge of Terrorism
SMi Homeland Security Conference
The Hatton, London, 20 February 2003

2002

Can We Trust the Experts?
International Book Festival
Edinburgh, 18 August 2002

The Loss of Trust
Science, Medicine and Expertise in Contemporary Society
Oxford Union, 15 June 2002

Getting Regulation Right: The Uses and Limits of the Precautionary Principle
21st Century Trust
Merton College, Oxford, 7 April 2002

The Demoralization of Science
Demoralization: Morality, Authority and Power
University of Cardiff, 5 April 2002

The New Morality of Risk Awareness – A Case Study
Medical Research Council – Institute for Environment and Health
Leicester, 21 March 2002

Public Health Communication and 'New Terrorism'
NATO Parliamentary Assembly Sub-Committee on the Proliferation of Military Technology
King's College London, 4 March 2002

2001

The True Cost of Precautionary Chemicals Regulation
Royal Commission on Environmental Pollution
London, 19 July 2001

CURRICULUM VITAE ABREGE

Professeur Jean-Marc ORGOGOZO, Neurologue.
Né le 28 Février 1948 à Saint Jean de Luz (Pyrénées Atlantique).

Thèse : **Doctorat en Médecine**, Université de Bordeaux, 1975

Spécialisations : **Médecine Nucléaire**, INSTN, Saclay, 1973
Neurologie, Diplôme national, France, 1977

Professeur des Universités, Neurologie, 1981

Chef de Service de Neurologie, CHU Pellegrin, Bordeaux, 1993

Chercheur de l'Unité INSERM U-330, Neuroépidémiologie, Bordeaux, 1994

Conseiller en Neurologie, 1984, **Expert en Neurologie,** 1996, auprès de l'OMS (Organisation Mondiale de la Santé

Président du Groupe d'Experts " Vin et Santé " de l'Office Internat. Vigne et Vin (OIV), 1998

Grand Connétable du Chapitre Fédéral de la Connétablie de Guyenne, 2000

Amateur et admirateur du vin de Bordeaux depuis Mai 1968, à la suite d'une révolution culturelle! Consommateur régulier, mais modéré, depuis cette époque. Collaborateur occasionnel de " l'Amateur de Bordeaux ". Auteur de nombreux articles de vulgarisation sur " Vin et Santé ".

Co-auteur et auteur en 1993 et 1998 des articles sur les effets du vin contre la maladie d'Alzheimer, découverts au Laboratoire d'Epidémiologie du Pr Dartigues, repris par de nombreux journaux et magazines (British Medical Journal, The Times, New-York Herald, Boston Globe, Figaro, Nouvel Observateur, Wine Spectator, Wine and Dine, etc…)

Publications scientifiques sur le sujet :

LETENNEUR L, DARTIGUES JF, ORGOGOZO JM
Wine consumption and cognitive deficit in elderly individuals from Bordeaux area.
Annals of Internal Medicine, 1993, vol. 18, n° 4 : 317-318

ORGOGOZO JM, DARTIGUES JF, RENAUD S.
Vin, alcool et accidents vasculaires cérébraux : données épidémiologiques.
Sang, Thrombose, Vaisseaux, 1996; 8:541-549

ORGOGOZO JM, DARTIGUES JF, LAFONT S, LETENNEUR L, COMMENGES D, SALAMON R, RENAUD S, BRETELER M.

Wine consumption and dementia in the elderly : a prospective community study in the Bordeaux area. Revue Neurologique, 1997; 153:3 : 185-192

LEMESHOW S, LETENNEUR L, DARTIGUES JF, LAFONT S, ORGOGOZO JM,. Illustration of analysis taking into account complex survey considerations: the association between wine consumption and dementia in the PAQUID study. American Journal of Epidemiology, 1998 ; 148 : 298-306

ORGOGOZO JM & RENAUD S. "Alcohol and Stroke " in : John Norris and Vladimir Hachinski Eds. Stroke Prevention. Oxford University Press, 2001. 347 pp.

Pedro Manuel Marques Vidal

Born November the 11th 1962, in Lisbon.

Academic Curriculum

1987: "internat de spécialité" (examination to become a specialist) in Clinical Investigation, Toulouse Hospital, France.

1988: Master's degree in Human Physiopathology, Atherosclerosis and Thrombosis, University of Toulouse, France. Course in technical and scientific English, University of Toulouse.

1990: MD in Clinical Investigation, *cum laude*. The thesis won the gold medal of the Toulouse III University.

1991: PhD in Biochemistry, Paul Sabatier University at Toulouse, *cum laude*.

1992: Master's degree in Statistics and Health, University of Paris XI.

1995: Summer course in Quantitative methods in medical research, Rotterdam University.

Professional activity

2003 to present: auxiliary professor of Nutrition at the Medical Faculty of Lisbon, Portugal. Member of the Nutrition and Metabolism research team, main research area Nutritional Epidemiology.

1999 to 2003: vice-director of the Escola Superior de Saúde Egas Moniz, Monte da Caparica, Portugal.

1997 to 2002: head of the research team *Farmacoterapia, Nutrição e Estudos Biofarmacêuticos* at the Instituto Superior de Ciências da Saúde – Sul, Monte da Caparica, Portugal.

1996 to 2004: professor of Informatics and Statistics for the Health Sciences at the Instituto Superior de Ciências da Saúde – Sul, Portugal.

1995: EU fellowship (Human Capital and Mobility) in Helsinki, departments of Biochemistry and Epidemiology. Research on cardiovascular risk factors and quality control of high density lipoprotein measurements for the W.H.O.-MONICA Project.

1990 to 1994: INSERM 326, "Phospholipides membranaires, signalisation cellulaire et lipoprotéines", Toulouse, France. Fundamental research on high density lipoprotein metabolism and on the epidemiology of cardiovascular risk factors at the W.H.O. - MONICA project. Work for pharmaceutical companies (Lipha, Lederle…) on the design and analysis of small clinical studies. Spent one year at the INSERM 258 "Epidémiologie cardio-vasculaire" (Hôpital Broussais, Paris). Leader of the working group for the analysis of cardiovascular risk factors of the PRIME study (international, multicentre prospective study on cardiovascular disease).

1987 to 1989: Pr. Bertrand Perret's research team on atherosclerosis and lipoproteins. INSERM 101, Biochimie des lipides, Toulouse, France.

1987: internal medicine and cardiology, University Hospital of Toulouse-Purpan, Toulouse, France.

1986 to 1987: general clinic, General Hospital of Saint-Gaudens, France.

Main research areas

Nutritional epidemiology, with a particular focus on the relationships between alcohol intake and cardiovascular risk factors. Currently working on the trends and determinants of adult and child obesity in Portugal.

International publications

1. C. Azema, **P. Marques-Vidal**, A. Lespine, G. Simard, H. Chap, B. Perret. Kinetic evidence for phosphatidylethanolamine and triacylglycerol as preferential substrates for hepatic lipase in HDL subfractions: modulations by changes in the particle surface, or in the lipid core. *Biochimica Biophysica Acta* 1990;1046(1):73-80.

2. **P. Marques-Vidal**, C. Azéma, X. Collet, H. Chap, B. Perret. Hepatic lipase-mediated hydrolysis versus liver uptake of HDL phospholipids and triacylglycerols by the perfused rat liver. *Biochimica Biophysica Acta* 1991;1082(2):185-194.

3. J.P. Cambou, B. Lablache-Combier, **P. Marques-Vidal**, J.B. Ruidavets, M.P. Branchu, J. Ferrières. Caractéristiques des coronariens et prescription d'aspirine en Haute-Garonne. *Annales de Cardiologie et d'Angéiologie* 1994;43(10):588-593.

4. **P. Marques-Vidal**, C Azema, X. Collet, B. Perret, H. Chap. Hepatic lipase promotes the uptake of HDL esterified cholesterol by the perfused rat liver: study using reconstituted HDL particles of defined phospholipid composition. *Journal of Lipid Research* 1994;35(3):373-384.

5. **P. Marques-Vidal**, R. Rakotovao, P. Ducimetière. Erreurs de mesure et régression linéaire. *Revue d'Epidémiologie et de Santé Publique* 1994;42(1):58-67.

6. L. Tiret, A. Bonnardeaux, O. Poirier, S. Ricard, **P. Marques-Vidal**, A. Evans, D. Arveiler, G. Luc, F. Kee, P. Ducimetière, F. Soubrier, F. Cambien. Synergistic effects of angiotensin-converting enzyme and angiotensin II type 1 receptor gene polymorphisms on risk of myocardial infarction. *The Lancet* 1994;344(8927):910-913.

7. J.P. Cambou, B. Lablache-Combier, **P. Marques-Vidal**, J.B. Ruidavets, J. Ferrières, M.P. Branchu, J.L. Richard. Antiagrégants, aspirine, infarctus du myocarde et décès coronaires en Haute-Garonne. *Archives des Maladies du Coeur et des Vaisseaux* 1995;88(4):459-463.

8. J. Emmerich, O. Poirier, E. Evans, **P. Marques-Vidal**, D. Arveiler, G. Luc, M. Aiach, F. Cambien. Myocardial infarction, Arg 506 to Gln factor V mutation and activated protein C resistance. *The Lancet* 1995;345(8945):321.

9. F. Fumeron, D. Betoulle, G. Luc, I. Behague, S. Ricard, O. Poirier, R. Jamaa, A. Evans, D. Arveiler, **P. Marques-Vidal**, J.M. Bard, J.C. Fruchart, P. Ducimetière, M. Apfelbaum, F. Cambien. Alcohol intake modulates the effect of a polymorphism of the cholesteryl ester transfer protein gene on plasma high density lipoprotein and the risk of myocardial infarction. *Journal of Clinical Investigation* 1995;96(3):1664-1671.

10. **P. Marques-Vidal**, J.P. Cambou, A. Evans, D. Arveiler, G. Luc, A. Bingham, F. Cambien. Medical treatment of myocardial infarction in France and Northern Ireland: results from the ECTIM Study. *European Heart Journal* 1995;16(3):348-353.

11. **P. Marques-Vidal**, J.P. Cambou, V. Nicaud, G. Luc, A. Evans, D. Arveiler, A. Bingham, F. Cambien. Cardiovascular risk factors and alcohol consumption in France and Northern Ireland. *Atherosclerosis* 1995;115(2):225-232.

12. **P. Marques-Vidal**, J.B. Ruidavets, J.P. Cambou, F. Cambien, H. Chap, B. Perret. Distribution, fatty acid composition and apolipoprotein A-I immunoreactivity of high density lipoprotein subfractions in myocardial infarction. *Atherosclerosis* 1995;112(1):29-38.

13. **P. Marques-Vidal**, P. Sié, H. Chap, B. Perret. Relationships of plasminogen activator inhibitor activity and lipoprotein(a) with insulin, testosterone, estradiol and testosterone binding globulin in myocardial infarction patients and healthy controls. *Journal of Clinical Endocrinology and Metabolism* 1995;80(6):1794-1798.

14. A.M. Dupuy-Gorce, E. Desmarais, S. Vigneron, C. Buresi, V. Nicaud, A. Evans, D. Arveiler, **P. Marques-Vidal**, F. Cambien, L. Tiret, A.C. Depaulet, G. Roizès. DNA polymorphisms in linkage disequilibrium at the 3' end of the human apo A-II gene - relationships with lipids, apolipoproteins and coronary heart disease. *Clinical Genetics* 1996;50(4):191-198.

15. V. Graille, J. Ferrières, **P. Marques-Vidal**, J.B. Ruidavets, P. Rodier, J.P. Cambou. Evolution à long terme de la prescription médicamenteuse chez 174 patients atteints d'infarctus du

myocarde suivis pendant 4,5 ans (étude DEVENIR). *Archives des Maladies du Coeur et des Vaisseaux* 1996;89(1):35-39.

16. S.M. Herrmann, H. Blanc, O. Poirier, D. Arveiler, G. Luc, A. Evans, **P. Marques-Vidal**, J.M. Bard, F. Cambien. The Gln/Arg polymorphism of human paraoxonase (PON 192) is not related to myocardial infarction in the ECTIM Study. *Atherosclerosis* 1996;126(2):299-303.
17. A.N. Howard, N.R. Williams, C.R. Palmer, J.P. Cambou, A.E. Evans, J.W. Foote, **P. Marques-Vidal**, E.E. McCrum, J.B. Ruidavets, S.V. Nigdikar, J. Rajput-Williams, D.I. Turnham. Do hydroxy-carotenoids prevent coronary heart disease? A comparison between Belfast and Toulouse. *International Journal for Vitamin and Nutrition Research* 1996;66(2):113-118.
18. F. Mailly, R.M. Fisher, V. Nicaud, L.A. Luong, A.E. Evans, **P. Marques-Vidal**, G. Luc, D. Arveiler, J.M. Bard, O. Poirier, P.J. Talmud, S.E. Humphries. Association between the LPL-D9N mutation in the lipoprotein lipase gene and plasma lipid traits in myocardial infarction survivors from the ECTIM study. *Atherosclerosis* 1996;122(1):21-28.
19. **P. Marques-Vidal**. Response to "Alcohol consumption and coronary heart disease: good habits may be more important than just good wine". *American Journal of Epidemiology* 1996;143(11):1099.
20. **P. Marques-Vidal**, J. Amar, J.P. Cambou, B. Chamontin. Relationships between blood pressure components, lipids and lipoproteins in normotensive men. *Journal of Human Hypertension* 1996;10(4):239-244.
21. **P. Marques-Vidal**, P. Ducimetière, A. Evans, J.P. Cambou, D. Arveiler. Alcohol consumption and myocardial infarction: a case-control study in France and Northern Ireland. *American Journal of Epidemiology* 1996;143(11):1089-1093.
22. **P. Marques-Vidal**, J. Ferrières, J.B. Ruidavets, J.P. Cambou. Evolution du dépistage et de la prise en charge de l'hypertension artérielle et de l'hypercholestérolémie chez les hommes en Haute-Garonne. *Revue d'Epidémiologie et de Santé Publique* 1996;44(3):193-199.
23. **P. Marques-Vidal**, J.B. Ruidavets, J. Ferrières, A. Bingham, J.P. Cambou. Evolution des facteurs de risque cardiovasculaire chez l'homme en Haute-Garonne, 1985-87 et 1989-91. Résultats du Projet MONICA. *Revue d'Epidémiologie et de Santé Publique* 1996;44(1):5-13.
24. O. Poirier, S. Ricard, I. Behague, C. Souriau, A.E. Evans, D. Arveiler, **P. Marques-Vidal**, G. Luc, G. Riozès, F. Cambien. Detection of new variants in the apolipoprotein B (apo B) gene by PCR-SSCP. *Human Mutation* 1996;8(3):282-285.
25. S. M. Herrmann, O. Poirier, **P. Marques-Vidal**, A. Evans, D. Arveiler, G. Luc, J. Emmerich, F. Cambien. The Leu^{33}/Pro polymorphism (Pl^{A1}/Pl^{A2}) of the glycoprotein IIIa (GPIIIa) receptor is not related to myocardial infarction in the ECTIM Study. Etude Cas-Temoins de l'Infarctus du Myocarde. *Thrombosis and Haemostasis* 1997;77(6):1179-1181.
26. **P. Marques-Vidal**, D. Arveiler, P. Amouyel, A. Bingham, J. Ferrières. Sex differences in awareness and control of hypertension in France. *Journal of Hypertension* 1997;15(11):1205-1210.
27. **P. Marques-Vidal**, J. Ferrières, M.-H. Metzger, J.P. Cambou, B. Filipiak, H. Löwel, U. Keil. Trends in coronary heart disease morbidity and mortality and acute coronary care and case fatality from 1985-1989 in southern Germany and south-western France. *European Heart Journal* 1997;18(5):816-821.
28. **P. Marques-Vidal**, M. Jauhiainen, J. Metso, C. Ehnholm. Transformation of high density lipoprotein 2 particles by hepatic lipase and phospholipid transfer protein. *Atherosclerosis* 1997;133(1):87-95.
29. **P. Marques-Vidal**, J. Tuomilehto. Hypertension awareness, treatment and control in the community: is the "rule of halves" still valid? *Journal of Human Hypertension* 1997;11(4):213-220.
30. **P. Marques-Vidal**, D. Arveiler, A. Evans, M. Montaye, A. Bingham, J. B. Ruidavets, D. McMaster, B. Haas, P. Amouyel, P. Ducimetière. Patterns of alcohol consumption in middle-aged men from France and Northern Ireland. The PRIME study. *European Journal of Clinical Nutrition*

2000;54(4):321-328.

31. **P. Marques-Vidal**, D. Arveiler, A. Evans, M. Montaye, J. B. Ruidavets, B. Haas, J. Yarnell, A. Bingham, J. Ferrières, P. Amouyel, P. Ducimetière. Characteristics of male vitamin supplement users aged 50-59 years in France and Northern Ireland: the PRIME Study. Prospective Epidemiological Study of Myocardial Infarction. *International Journal of Vitamin and Nutrition Research* 2000;70(3):102-109.

32. **P. Marques-Vidal**, M. Montaye, B. Haas, A. Bingham, A. Evans, I. Juhan-Vague, J. Ferrières, G. Luc, P. Amouyel, D. Arveiler, D. McMaster, J. B. Ruidavets, J.M. Bard, P.Y. Scarabin, P. Ducimetière. Association of hypertensive status and its drug treatment with lipid and haemostatic factors in middle-aged men: the PRIME study. *Journal of Human Hypertension* 2000;14(8):511-518.

33. **P. Marques-Vidal**, J. Ruidavets, J. Cambou, J. Ferrières. Trends in hypertension prevalence and management in southwestern France, 1985-1996. *Journal of Clinical Epidemiology* 2000;53(12):1230-1235.

34. **P. Marques-Vidal**, J. B. Ruidavets, J.P. Cambou, J. Ferrières. Incidence, recurrence, and case fatality rates for myocardial infarction in southwestern France, 1985 to 1993. *Heart* 2000;84(2):171-175.

35. **P. Marques-Vidal**, J. B. Ruidavets, N. Prouteau, G. Casteignau, M. Delay, J. Ferrières. Prevalence of late potentials in a sample of 487 healthy, middle-aged men from southwestern France. *Pacing and Clinical Electrophysiology* 2000;23(5):888-890.

36. **P. Marques-Vidal**, D. Arveiler, P. Amouyel, P. Ducimetière, J. Ferrières. Myocardial infarction rates are higher on weekends than on weekdays in middle aged French men. *Heart* 2001;86(3):341-342.

37. **P. Marques-Vidal**, D. Arveiler, P. Amouyel, P. Ducimetière, J. Ferrières. Coût de la prise en charge médicamenteuse des facteurs de risque cardio-vasculaire chez des hommes d'âge moyen, étude PRIME. *Revue d'Epidémiologie et de Santé Publique* 2001;49(6):541-549.

38. **P. Marques-Vidal**, D. Arveiler, A. Evans, P. Amouyel, J. Ferrières, P. Ducimetière. Different alcohol drinking and blood pressure relationships in France and Northern Ireland: the PRIME Study. *Hypertension* 2001;38(6):1361-1366.

39. **P. Marques-Vidal**, J.P. Cambou, J. Ferrières, D. Thomas, O. Grenier, C. Cantet, N. Danchin. Distribution et prise en charge des facteurs de risque cardiovasculaires chez des patients coronariens: étude Prévenir. *Archives des Maladies du Coeur et des Vaisseaux* 2001;94(7):673-680.

40. **P. Marques-Vidal**, S. Llobet, J. A. Carvalho Rodrigues, M. J. Halpern. Cardiovascular risk factor levels in Portuguese students. *Acta Cardiologica* 2001;56(2):97-101.

41. **P. Marques-Vidal**, M. Montaye, B. Haas, A. Bingham, A. Evans, I. Juhan-Vague, J. Ferrières, G. Luc, P. Amouyel, D. Arveiler, J. Yarnell, J. B. Ruidavets, P. Scarabin, P. Ducimetière. Relationships between alcoholic beverages and cardiovascular risk factor levels in middle-aged men, the PRIME study. *Atherosclerosis* 2001;157(2):431-440.

42. **P. Marques-Vidal**, D. Arveiler, A. Evans, P. Amouyel, J. Ferrières, G. Luc, P. Ducimetière. Awareness, treatment and control of hyperlipidaemia in middle-aged men in France and Northern Ireland in 1991-1993: the PRIME study. Prospective epidemiological study of myocardial infarction. *Acta Cardiologica* 2002;57(2):117-123.

43. **P. Marques-Vidal**, V. Bongard, D. Arveiler, P. Amouyel, P. Ducimetière, J. Ferrières. Coût de la prise en charge médicamenteuse des facteurs de risque cardio-vasculaire en France. *Archives des Maladies du Coeur et des Vaisseaux* 2002;95(4):275-281.

44. **P. Marques-Vidal**, E. Mazoyer, V. Bongard, P. Gourdy, J. B. Ruidavets, L. Drouet, J. Ferrières. Prevalence of insulin resistance syndrome in southwestern France and its relationship with inflammatory and hemostatic markers. *Diabetes Care* 2002;25(8):1371-1317.

45. **P. Marques-Vidal**, J. B. Ruidavets, J.P. Cambou, J. Ferrières. Trends in overweight and obesity in middle-aged subjects from southwestern France, 1985-1997. *International Journal of Obesity and Related Metabolic Disorders* 2002;26(5):732-734.

46. **P. Marques-Vidal**, V. Bongard, J. B. Ruidavets, J. Fauvel, H. Hanaire-Broutin, B. Perret, J. Ferrières. Obesity and alcohol modulate the effect of apolipoprotein E polymorphism on lipids and insulin. *Obesity Research* 2003;11(10):1200-1206.

47. **P. Marques-Vidal**, V. Bongard, J. B. Ruidavets, J. Fauvel, B. Perret, J. Ferrières. Effect of apolipoprotein E alleles and angiotensin-converting enzyme insertion/deletion polymorphisms on lipid and lipoprotein markers in middle-aged men and in patients with stable angina pectoris or healed myocardial infarction. *American Journal of Cardiology* 2003;92(9):1102-1105.

48. **P. Marques-Vidal**, J. Cambou, V. Bongard, J. Ruidavets, J. Ferrières. Systolic and diastolic hypertension: no relationship with lipid and inflammatory markers in Haute-Garonne, France. *American Journal of Hypertension* 2003;16(8):681-684.

49. **P. Marques-Vidal**, J. Cambou, J.B. Ruidavets, J. Ferrières. Changes and determinants in cigarette smoking prevalence in southwestern France, 1985-1997. *European Journal of Public Health* 2003;13(2):168-170.

50. **P. Marques-Vidal**, M. Montaye, J. B. Ruidavets, P. Amouyel, J. Ferrières. Evolution and cost trends of antihypertensive and hypolipidaemic drug treatment in France. *Cardiovascular Drugs and Therapy* 2003;17(2):175-189.

51. **P. Marques-Vidal**, J. B. Ruidavets, J.P. Cambou, J. Ferrières. Trends in myocardial infarction treatment in subjects aged 35-64 in Southwestern France, 1986-93. *International Journal of Cardiology* 2003;88(2-3):239-245.

52. P. Ravasco, I. Monteiro-Grillo, **P. Marques-Vidal**, E. Camilo. Nutritional deterioration in cancer: the role of disease and diet. *Clinical Oncology* 2003;15(8):443-450.

53. H. Cortez-Pinto, **P. Marques-Vidal**, E. Monteiro. Liver disease-related admissions in Portugal: clinical and demographic pattern. *European Journal of Gastroenterology and Hepatology* 2004;16(9):873-877.

54. **P. Marques-Vidal**, M. Montaye, D. Arveiler, A. Evans, A. Bingham, J. B. Ruidavets, P. Amouyel, B. Haas, J. Yarnell, P. Ducimetière, J. Ferrières. Alcohol consumption and cardiovascular disease: differential effects in France and Northern Ireland. The PRIME study. *European Journal of Cardiovascular Prevention and Rehabilitation* 2004;11(4):336-343.

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11. **P. Marques-Vidal**, C.M. dias. Obesidade? Qual obesidade (CA15). In: IX Congresso da Sociedade Portuguesa para o Estudo da Obesidade; 2005 November, 3-5; Lisboa, Portugal.
12. **P. Marques-Vidal**, C.M. Dias. Evolução da obesidade em Portugal, 1993-2003 (CA16). In: IX Congresso da Sociedade Portuguesa para o Estudo da Obesidade; 2005 November, 3-5;

Lisboa, Portugal.

13. **P. Marques-Vidal**, P. Ravasco, E. Camilo. É a obesidade factor de risco para o cancro colo-rectal? Uma meta-análise (CA18). In: IX Congresso da Sociedade Portuguesa para o Estudo da Obesidade; 2005 November, 3-5; Lisboa, Portugal.
14. S. Velho, F. Baptista, **P. Marques-Vidal**. Relação entre índice de massa corporal e a função cognitiva numa população de idosos que pratica exercício físico. In: IX Congresso da Sociedade Portuguesa para o Estudo da Obesidade; 2005 November, 3-5; Lisboa, Portugal.
15. P. Ventura, I. Monteiro Grillo, M. Gorayeb, **P. Marques-Vidal**. Prevalência da obesidade numa amostra de doentes com cancro da próstata (CA5). In: IX Congresso da Sociedade Portuguesa para o Estudo da Obesidade; 2005 November, 3-5; Lisboa, Portugal.

MYRON S. WEINBERG, Ph.D.

EDUCATION

1958	Ph.D., Medicinal Chemistry, Pharmacology, Pharmacy, University of Maryland, College Park, Maryland
1956	M.S., Medicinal Chemistry, Pharmacology, University of Maryland, College Park, Maryland
1954	B.S., Pharmacy, (Registered Pharmacist, Maryland), Fordham University-Rosehill, Bronx, New York
1950	B.A., Chemistry, Mathematics, History, New York University, New York, New York

EXPERIENCE

Dr. Myron S. Weinberg founded THE WEINBERG GROUP INC. in 1983. Dr. Weinberg provides services in product defense, technically oriented litigation, regulatory advice and compliance, policy development, and research and development organization. Prior to founding THE WEINBERG GROUP, Dr. Weinberg was senior vice president at Booz, Allen & Hamilton, Inc., where he directed biological, chemical, environmental, and regulatory activities and where he was President of Foster D. Snell, Inc., a laboratory that conducted product development, testing and evaluation services as well as chemical, biochemical, and toxicological analyses. Currently, he is an associate professor in the Department of Psychiatry, Georgetown Medical School in Washington, DC, and an associate professor in the Department of Pharmacology and Toxicology, Rutgers University, in New Brunswick, New Jersey.

ACADEMIC APPOINTMENTS

1993-present	Associate Professor of Pharmacology and Toxicology, Rutgers -- The State University, Piscataway, New Jersey
1990-present	Adjunct Associate Professor, Departments of Medicine and Psychiatry, Georgetown University, Washington, DC

HONORS

Sigma Chi, Graduate School Honor Society, 1958
Rho Chi, Pharmaceutical Honor Society, 1954
Listed in Marquis Who's Who in the World

PROFESSIONAL AFFILIATIONS

Fellow

American Institute of Chemical Engineers
American Institute of Chemists
American Society of Laboratory Medicine
Association of Clinical Scientists
Royal Society
Royal Society of Health

Member

American Association for the Advancement of Science
American Board of Forensic Examiners
American Chemical Society
American Society of Experimental Pharmacology and Chemotherapy
Society of Toxicology

SELECTED PUBLICATIONS

Approximately 100 publications and 2 books, including:

Buffers in Ruminant Physiology
Hawk's Physiological Chemistry

Recent invitational speeches include:

“Local Decisions – Worldwide Ramifications” *Regulatory Affairs* DIA 2003
"Responsible Risk Communication *A Public Health Responsibility*” APHA 2001
“The Use, Misuse And Disuse Of Science In Setting Policy, *The Public Health Dilemma”* APHA 2000
"New Directions In Toxic Tort Litigation"
"Europe 1992, Perestroika And All That"
"Psychology And The Law"
"The Pharmaceutical Industry: Europe vs. U.S."

ANNEX III - ADDITIONAL REFERENCES PROVIDED BY PANEL MEMBERS

Prof. Marie Choquet

Choquet, M., Menke, H. and Manfredi, R. 1991. Interpersonal aggressive behaviour and alcohol consumption among young urban adolescents in France. Alcohol Alcohol. 26(4):381-390.

Prof. Bill Durodié

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Prof. Jean-Marc Orgogozo

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Gronbaek, M., Deis, A., Sorensen, T.I., Becker, U., Schnohr, P., and Jensen, G. 1995. Mortality associated with moderate intakes of wine, beer, or spirits. BMJ 310(6988):1165-1169.

Jarvenpaa, T., Rinne, J.O., Koskenvuo, M., Raiha, I. and Kaprio, J. 2005. Binge drinking in midlife and dementia risk. Epidemiology 16:766-71.

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